THE REPERTORY OF PATENT INVENTIONS,

AND OTHER

Discoveries & Improvements

IN

ARTS, MANUFACTURES

AND

AGRICULTURE;

BEING A CONTINUATION, ON AN ENLARGED PLAN,

OF THE

Repertory of Arts & Manufactures,

A WORK ORIGINALLY UNDERTAKEN IN THE YEAR 1794, AND STILL CARRIED ON WITH A VIEW TO COLLECT, RECORD, AND BRING INTO PUBLIC NOTICE, THE USEFUL INVENTIONS OF ALL NATIONS.

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LIST OF PLATES

TO

VOL. XVI. NEW SERIES.

PLATE I. Forrester's Patent for Improvements in Sizing, Starching, Dressing, and Preparing Warps for Weaving Fabrics, and in Machinery therewith connected. 8vo.

PLATE II. Gilbert's Patent for Improvements in Machinery for Obtaining and Applying Motive Power.—Williams's Patent for Improvements in Measuring the Velocities with which Ships, &c. move in Fluids, and for ascertaining the Velocities of Fluids in Motion.—Horne's Patent for Improvements in the Manufacture of Hinges.—Barratt's Patent for Improvements in the Manufacture of Paper. 8vo.

PLATE III. Hirst's Patent for Improvements in the Manufacture of Woollen Cloths, &c.—Jefferies's Patent for Improvements in Obtaining Copper, Spelter, &c. from Ores.—Rapson's Patent for Improvements in Paddle Wheels for Propelling Vessels.—Talbot's Patent for Improvements in Obtaining Motive Power. 8vo.

PLATE IV. Walton's Patent for Improvements in the Manufacture of Beds, Mattresses, &c., and in Materials for Packing.—Wickes's Patent for Improvements in Machinery employed in Frame-Work Knitting or Stocking Fabries. 8vo.

PLATE V. Unsworth's Patent for Improvements in Machinery for Mangling, Drying, Damping, and Finishing Woven Goods or Fabrics. — Smith's, Patent for Improvements in Econozing Heat and Saving Fuel. 8vo.

PLATE VI. Holland's Patent for Improvements in the Manufacture of Umbrellas and Parasols.—Edwards's Patent for Improvements in Evaporation.—Bromwich's Patent for Improvements in Stirrup-irons.—Deacon's Patent for Improvements in the Manufacture of Glass Chimneys for Lamps. 8vo.

PLATE VII. Dickinson's Patent for Improvements in the Manufacture of Paper.—Orme's Patent for Improvements in the Manufacture of Coffered Spades, &c.—Wall's Patent for a new Composition for the Prevention of Corrosion of Metals. 8vo.

PLATE VIII. Nash's Patent for Improvements in Machinery for Winding, Spinning, Doubling, and Throwing Silk, &c.—Nash's Patent for Improvements in the Construction of Bridges, Viaducts, Roofs, and other parts of Buildings.—Orange's Patent for Improvements in Apparatus for Serving Ropes and Cables with Yarn. 8vo.

PLATE IX. Parker's Patent for Improvements in Lamps, &c.—Hood's Patent for Improvements in Giving Signals.—Baillie's Patent for Improvements in Locks and the Fastenings thereto belonging. 8vo.

PLATE X. Myers and Storer's Patent for Improvements in the construction of Musical Instruments; viz. Piano-fortes, Seraphines, and Organs. 8vo.

PLATE XI. Cutler and Hancock's Patent for an Improved Method of Cutting Corks and Constructing the Necks of Bottles. 8vo.

PLATE XII. Drake's Patent for Improvements in Scales used in Drawing and Laying Down Plans.—Perkins's Patent for Improvements in Apparatus for Heating by the Circulation of Hot Water, and for the Construction of Pipes or Tubes.—Ransome and May's Patent for Improvements in the Manufacture of Railway Chairs, Railway and other Pins or Bolts, and in Wood Fastenings and Tree Nails. 8vo.

PLATE XIII. Poole's Patent for Improvements in Tanning and Dressing or Currying of Skins.—Dodd's Patent for Improvements in Piano-fortes. 8vo.

PLATE XIV. Lowe's Patent for Improved Methods of Supplying Gas, and of Improving its Purity and Illuminating Power.—Morrall's Patent for Improvements in Making or Manufacturing Needles, and in the Machinery employed therein. 8vo.

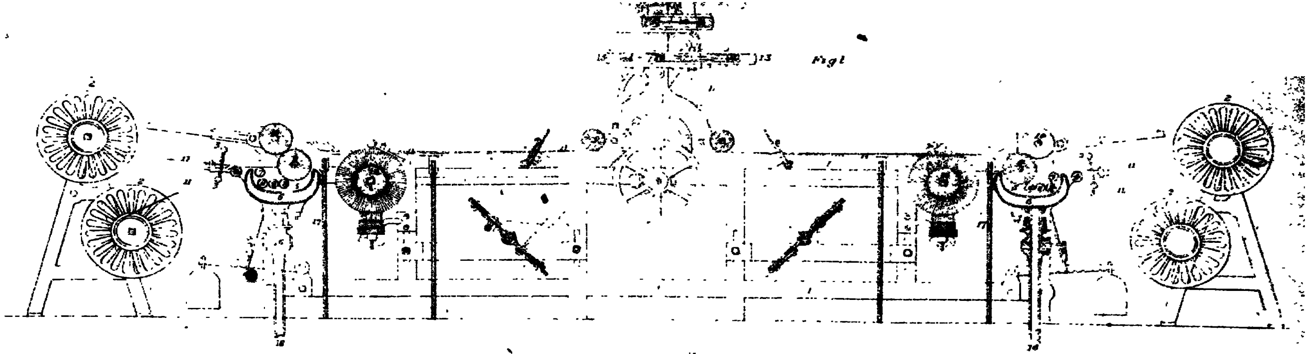
PLATE XV. Dashwood's Patent for Improvements in Pumps.—Guest and Evans's Patent for Improvements in the Manufacture of Iron, &c.—White's Patent for Improvements in Vices.—Spencer's Patent for Improvements in the Manufacture of Picture and other Frames and Cornices, &c. 8vo.

PLATE XVI. McNab's Patent for Improvements in the Manufacture of Bricks.—Williams's Patent for Improvements in Obtaining Power from Steam and other Vapours, and in Generating such Vapours.—Condie's Patent for Improvements in Applying Springs to Locomotive, Railway, and other Carriages. 8vo.

PLATE XVII. Rand's Patent for Improvements in Preserving Paint and other Fluids.—Parkes's Patent for Improvements in the Manufacture of Covered Buttons.—Vaux's Patent for Improvements in Horse-Shoes.—Montmirail's Patent for Improvements in the Manufacture of Bread. 8vo.

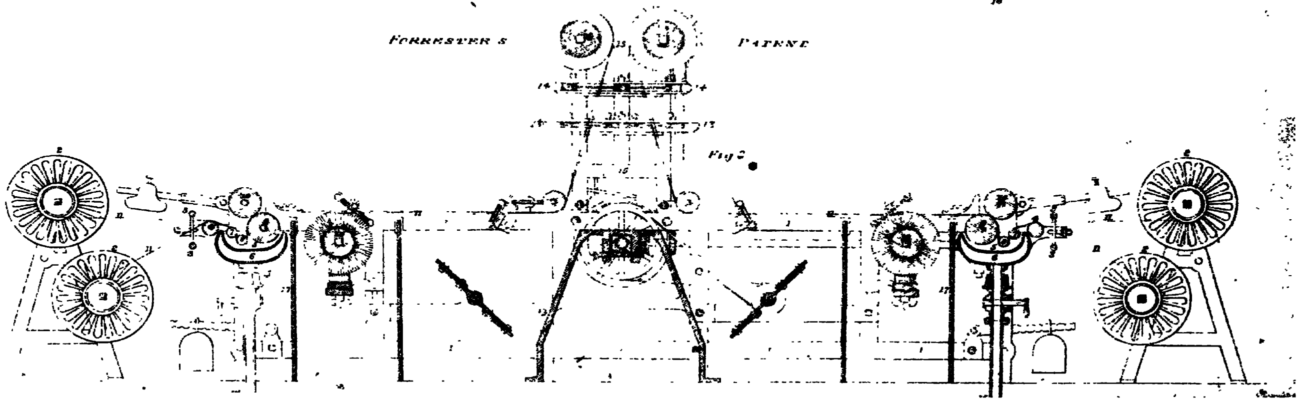
PLATE XVIII. Pope's Patent for Improvements in Detaching Locomotive and other Carriages.—Finch's Patent for Improvements in Propelling Vessels.—Vandeleur's Patent for Improvements in Paving Roads. 8vo.

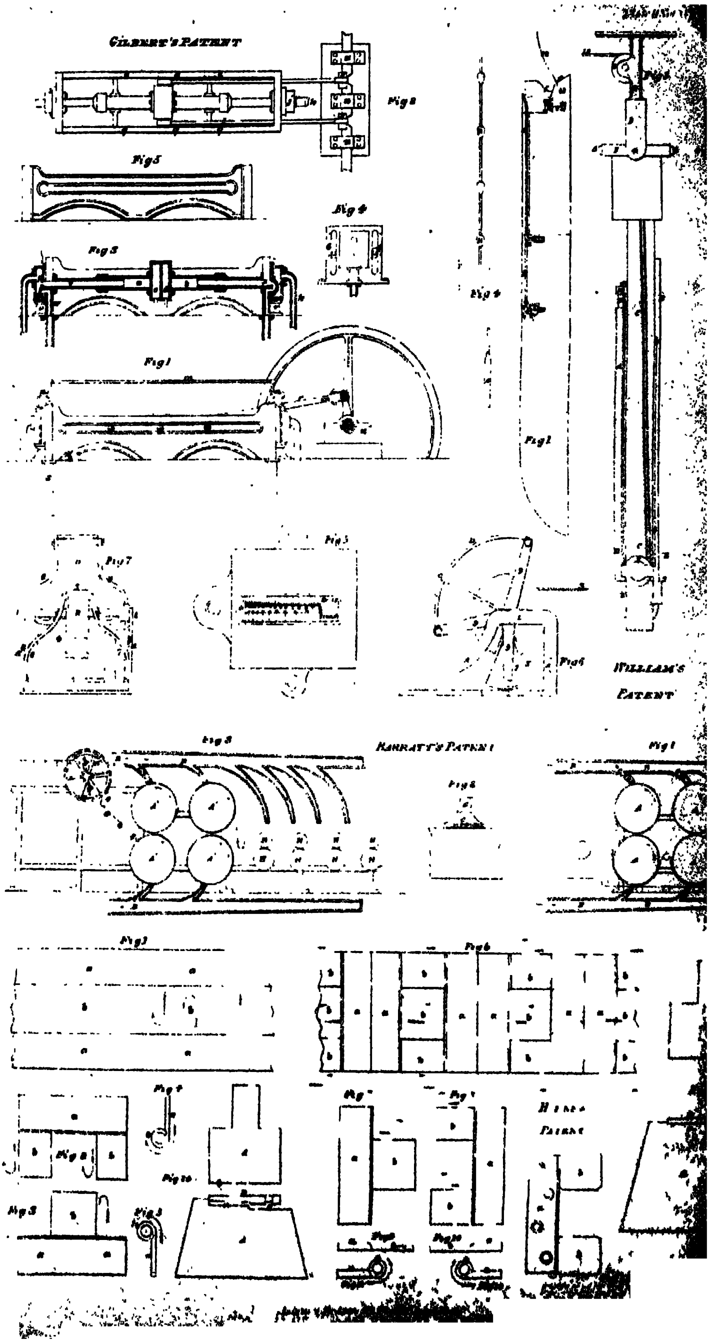
Fig 1

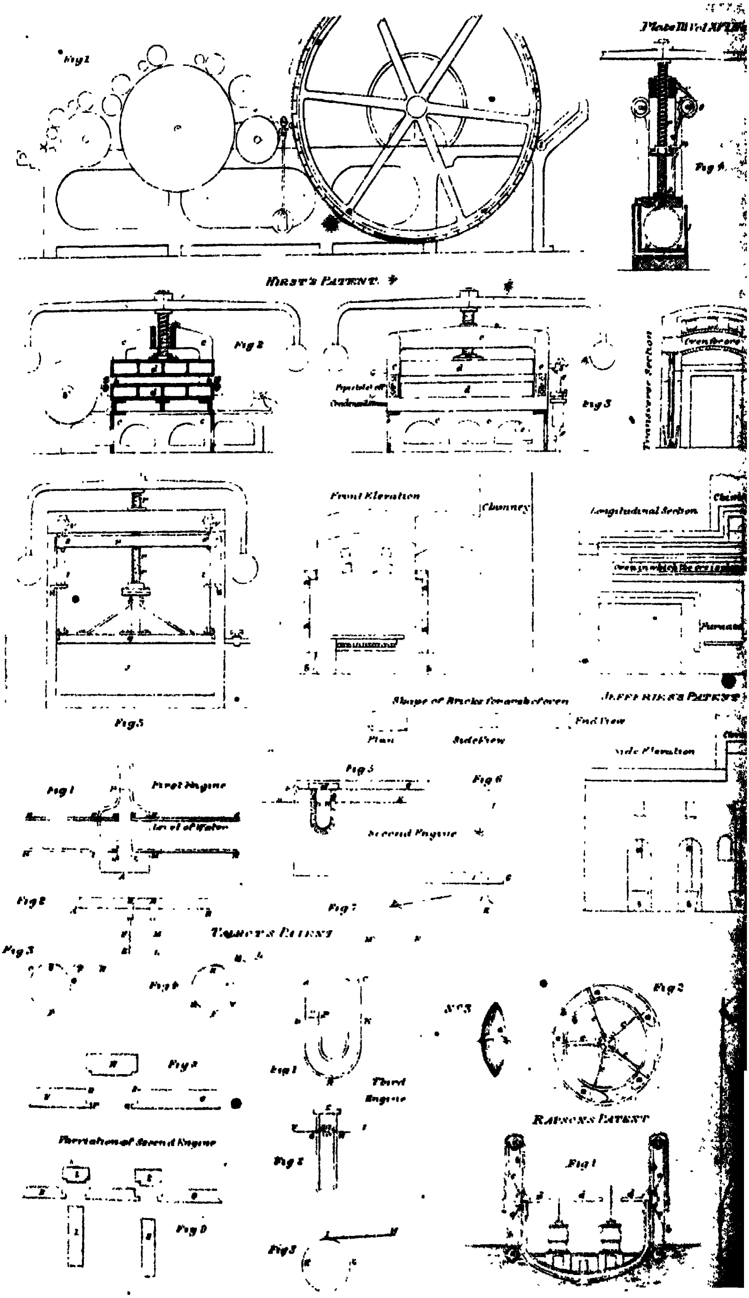


FORRESTER'S PATENT

Fig 2




GILBERT'S PATENT
WILLIAM'S PATENT



London Hodson 112 Fleet St July 1 1841

THE

REPERTORY

OF

PATENT INVENTIONS.

No. XCI. NEW SERIES.—JULY, 1841.

Specification of the Patent granted to WILLIAM FORRESTER, *residing at Burrhead, in the County of Renfrew, Manager at Levern Mill, for certain Improvements in Sizing, Starching, Dressing, and otherwise Preparing Warps for Weaving Fabrics, and in the Machinery and Apparatus therewith connected.*—Sealed March 11, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said William Forrester, do hereby declare the nature of my invention, and the manner in which the same is to be performed, are particularly described and contained in the following description thereof, reference being had to the drawings hereunto annexed, and to the figures marked thereon (that is to say):—

My said invention consists in pressing the yarns or warps in being dressed or sized through a trough containing paste, dressing, or size in a hot state, and in keeping the threads from running into strands during that process, and thereafter applying a brush or brushes for the purpose of smoothing the fibres of the threads as they

pass along to be dried, thereby combining the advantages of hot sizing and of brushing in one process, whereby a greater amount of work can be performed at less cost, whilst the warps are better prepared for weaving; and which improvements can either be attached to any existing dressing machine, or may be arranged when necessary in a frame-work of a convenient structure. In order to illustrate the peculiarities of my invention, I shall refer to a sheet of drawings hereunto attached, the same numbers of reference being attached to the different views of the corresponding parts in the different figures.

Description of the Drawing.

Fig. 1, exhibits a longitudinal vertical section of a dressing-machine of one of the usual construction.

Fig. 2, a similar section of a machine converted into a double beam-machine, whereby two webs are dressed in the same machine at one time. 1, the general framework of the machine. 2, warp-beams, from which the warp is being uncovered. 3, reeds through which the warps pass, in order to keep the threads properly divided when passing on to the bearing-rollers, 4, and which rollers receive the threads from the reels in equal distribution. 5, a trough made of copper, cast-iron, or any other suitable material for containing the size or dressing in the usual way. 6, a casing surrounding the outer surface of the trough, and being so attached to the edges of the trough as to form an air-tight chamber, into which steam, hot water, or other suitable fluid is caused to flow, whereby the size or paste is kept to the necessary degree of heat, being 160° of Fahrenheit, or thereby. 7, a roller partly immersed in the hot size, receiving the threads equally divided from the bearing-roller, and so conducting them into the hot size or paste. 8, rollers of copper, brass, or other suitable material, so placed over the warp as to immerse it completely in the hot dressing or size, whereby the air is expelled from the body of the threads,

and the size or dressing is caused to penetrate the whole body of each thread. One or more rollers may be used, as experience of the particular fabric shall point out. 9, usual paste-roller of the dressing-machine, over which the threads pass after emerging from the hot size. 10, the roller commonly used in pressing out the superabundant dressing, which is placed behind the central line, in order that the workmen may have room to pick up any threads which break, without cross-lifting. 11, the warp-threads passing along in the usual way. 12, a circular brush of the usual construction for brushing and smoothing the threads; but it is evident that the sweep-brushes may be used for the same purpose. 13, heddles through which the threads pass for the purpose of taking the case when the successive beams are cut out. 14, the crown-reels through which the warps pass, that they may be disposed in due order upon the beam. 15, fig. 2, a frame-work containing the heddles, reeds, beams, and other apparatus necessary when two webs are to be dressed in the same machine at one time. 16, an inch-pipe for admitting the steam to the trough-casing, 6. On the opposite section of the trough there is a half-inch pipe for leading off the condensed steam. On the same side of the trough is a discharging-pipe for the purpose of running off the dressing when the trough requires to be cleaned; near to this in the casing is placed a safety-valve, for the purpose of admitting air, in the case of a vacuum being found inside. 17, boards to prevent the heat of the trough coming in contact with the cylinder-brushes.

N.B. I do not think it necessary to refer to any of the parts of the ordinary dressing-machine exhibited in the drawings, which are not necessary for the illustration of my improvement.

Having thus described the various parts of the construction necessary for accomplishing my improved method of sizing or dressing warps, I do not claim as of my invention any of the well known parts of the dress-

ing-machine or of the sizing-trough. But I do claim, first, the passing of the warp-threads into the trough in a uniform and fully extended sheet, and in that position conducting them into the size-trough by rollers so disposed, that whilst they accomplish a complete immersion of the threads amongst the size or dressing, they, from their near approach to each other, permit only a small length of the threads to be free from the least point of contact of the one to the first point of contact of the other, thereby preventing the threads from packing together, or drawing into strands.

Secondly, I claim the application of a brush or brushes for the purpose of smoothing the fibres of the threads in emerging from the sizing-trough whilst they are in a hot state.

Thirdly, I claim the disposal of the threads singly, or at most in pairs, in uniformly divided positions upon the bearing-beam or roller, after having been so sized; and,

Fourthly, I claim the adaptation of apparatus for sizing or dressing two separate webs at the same time in the same machine.—In witness whereof, &c.

Enrolled September 11, 1841.

Specification of the Patent granted to George Alexander Gilbert, *late of Southampton Buildings, in the County of Middlesex, but now of Norfolk House, Battersea, in the County of Surrey, Gentleman, for certain Improvements in Machinery or Apparatus for Obtaining and Applying Motive Power.*—Sealed September 10, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said George Alexander Gilbert, do hereby declare

that the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the letters and figures marked thereon (that is to say) :—

My invention of improvements in machinery or apparatus for obtaining motive power consists in certain novel features in the construction of engines to be actuated by steam, air, gas, or other elastic fluid, whereby I am enabled to dispense with the ponderous cylinder heretofore used, and substitute in its place certain tubes which slide one within another, in the same manner as the tubes of a telescope, from which cause I denominate them telescopic tubes; but in order that my invention may be fully understood, I have shewn, in the accompanying sheet of drawings, several views of a double acting engine, constructed on the above plan, similar letters of reference denoting corresponding parts in all the figures.

Description of the Drawing.

Fig. 1, is a side elevation of the engine in all its parts.

Fig. 2, is a plan, or bird's eye view of the same.

Fig. 3, is a vertical section of the working parts taken longitudinally, the fly-wheel and cranks being removed.

Fig. 4, is an end elevation of fig. 3, seen partly in section; and,

Fig. 5, represents the side framing of the engine.

That part of the engine which is intended as a substitute for the ordinary cylinder consists of two tubes, *a* and *b*, fig. 3. One end of each tube is bolted to a steam-box or chamber, which is divided in the middle into two compartments, *c* and *d*. The tubes, *a* and *b*, slide on stationary tubes, *e*, *f*, affixed to the frame-work, and there are stuffing-boxes, *g*, *g*, formed on or attached to the ends of the tubes, *a* and *b*, to keep the joints steam-tight. There are two cocks, *v*, *v*, at the under parts of the steam-

box, which are for the purpose of allowing any steam, air, or vapour contained therein to escape previous to setting the engine to work. Valves, *h* and *i*, of the ordinary construction, are to be actuated in such manner, that they will alternately admit the steam into the tubes, *e* or *f*, and afterwards allow it to escape therefrom. The valve, *h*, is in the position it would occupy when steam is passing into the tubes, *a* and *e*, and the valve, *i*, has its exit passage open, in order to allow the steam in the tubes, *b* and *f*, to escape. Steam is conveyed from the boiler by the pipe, *j*, into the end steam-box, *k*, from whence it passes through the valve, *h*, into the stationary tube, *e*, and from thence through the sliding tube, *a*, into the steam-chamber or box, *c*, in the middle of the machine. The steam exerting its elastic force against the partition or end of the chamber, *c*, propels or forces the box and sliding tubes, *a*, *b*, *c*, and *d*, towards the right hand, and the steam or other vapour previously occupying the chamber and tube, *b*, *d*, and *f*, will be thereby expelled, and escape through the (then) open valve, *i*, and pipe, *l*, either to the atmosphere or into a condenser. When the sliding tube, *b*, has arrived at the end of its course, the valves, *h* and *i*, are shifted by means of an eccentric knot shewn in the drawing, which, acting upon the rod and levers, *m*, *m*, changes the positions. Steam is then admitted by the pipe, *o*, and passing through the valve, *i*, the fixed tube, *f*, and sliding tube, *b*, enters the steam-box or chamber, *d*, where, exerting its elastic force as before, propels the sliding tubes and box in the opposite direction, that is, as the dotted arrow, and the steam, which had previously exerted its elastic force in the chamber and tubes, *a*, *c*, and *e*, being by these means expelled therefrom, passes off through the exit-pipe, *p*. The box, *c*, *d*, and tubes, *a*, *b*, are mounted on pulleys or anti-friction-rollers, *q*, *q*, *q*, *q*, see figs. 1 and 2, which run in grooves formed in the frame-work, represented at fig. 5. The reciprocating movement of the box and tubes produces, or is converted

into a rotary movement in the following manner: connecting rods, *r*, *r*, are attached to the exterior of the steam-box, by means of pivotts, represented in the plan-view, fig. 2, the reverse ends of these rods are connected to the cranks, *s*, *s*, of the main shaft, *t*, which is mounted in plummer-boxes, *u*, *u*. From this shaft the moving power is communicated by a pulley and band, governed by a fly-wheel, for the purpose of driving other machinery.

I would wish it to be understood, that although I have generally mentioned steam as the vapour employed for actuating the engine, yet sometimes I employ air or gas under certain circumstances, and find them more convenient than steam, I therefore do not intend to confine myself to any particular fluid or fluids for actuating my improved engine, nor do I confine myself to the precise arrangement of the parts shewn in the drawing, as I sometimes construct the engine in such a manner that the sliding tubes shall move up and down perpendicularly, instead of sliding in the horizontal manner herein shewn and described.

Lastly, I desire it to be understood, that I claim as my invention the mode or method of producing motive power by the use of steam, gas, or any other fluid, conjointly or separately, as above described.—In witness whereof, &c.

Enrolled March 10, 1841.

Specification of the Patent granted to THOMAS ROBINSON WILLIAMS, *of Cheapside, in the City of London, Gentleman, for certain Improvements in Measuring the Velocities with which Ships or other Vessels or Bodies Move in Fluids, and also for Ascertaining the Velocities of Fluids in Motion.*—Sealed June 27, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—

Now know ye, that in compliance with the said proviso, I, the said Thomas Robinson Williams, do hereby declare the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention consists in several different arrangements of apparatus adapted, after repeated trials, to the various circumstances under which moving bodies have relation to the fluids in which they move. I will first describe these different arrangements, which apply more particularly to ships and vessels, and which also become more conveniently adapted by various modifications, agreeable to circumstances, as to whether these be propelled by wind or steam, as well as whether they be principally intended for river or sea navigation.

Description of the Drawings.

For river navigation, where the cargo is not liable to great fluctuation in weight, and the perpendicular height of the vessel, as regards the water-line, or the horizontal line, or evenness of keels, is less disturbed than in sea navigation, I use a bent tube (which I prefer of copper), A, B, fig. 1, inserted either through the stern-post or keel, or by the side of either of them, and passed down the stern-post to near its keel, and then being bent backwards, that is, in a direction contrary to the bows or head of the vessel, and made to point rather below or under the rudder, projects through but a short distance from the stern-post, according to its size, and should be merely of sufficient length to be clear of the dead water behind the post or heel—this end is left open to the water. The inner end is then bent upwards through the floor of the room or cabin, *a*, where a float-bob of light hollow glass or metal, with a rod attached, *b*, pro-

vided with a scale similar to common guages for steam, &c., or when the water-line is not inconveniently low, a strong glass-tube is made to form the upper part of the tube, including the water-line, that is, the point to which the water will rise, when the vessel is not in motion; this then becomes the zero point upon the scale, and with whatever velocity the vessel sails in a forward direction, produces a partial exhaustion of the water from this tube, or a depression of its surface therein, and consequently indicates the speed with very great accuracy. I may also here observe that it is evident this tube may be extended much further forward in the vessel, if wished, say into the engine-room of steam vessels, and that there may be more than one upright tube or indicator when desirable. I have also attached to this main a bent glass-tube, the two ends being upwards, and one of them connected with the main, the other open to the atmosphere (as in the other cases); this bent tube being partially filled with mercury, and having a scale attached, of course indicates the velocity by the surface of the mercury in the proportion of the weight of mercury to that of water. To remedy this inconvenience, however, on this principle of the fluctuations of the weight of cargo, I sometimes employ a water-cistern, c, of one, two, or three feet square, and of sufficient depth, which I place in the most convenient situation, and as near midships and over the keel as possible, having small and safe external communications, *c*, *c*, through the vessel, into which the water may flow in and out, that its surface may always correspond with the external water-line. Within this box or cistern, another flat metallic or other box, *d*, is made to float, but so as to sink considerably below the surface of the before mentioned cistern; through the bottom of this float are firmly soldered or fixed, either the single or bent tube, with its scale, and which I then connect with a flexible India-rubber or other tube, *e*, with the before mentioned main, A, B.

Another apparatus for this purpose, which has been

found fully to answer for sea or river navigation, whether by wind or steam, and all general purposes exceedingly well, consists of an instrument suspended in gimbles, or in other words, by an universal joint in any convenient part of the vessel, such as the companion way, or captain's room, and a plummett or dragg, or a drag-chain or line, &c., to be towed overboard and attached thereto, as hereinafter described.

Fig. 2, is a drawing of the instrument entire.

Fig. 3, is another view, with its outer case removed; and,

Fig. 4, those of the various plummets or drags, which I use with this and the hereafter mentioned instruments.

Fig. 3 A, is an iron cylinder or chamber, of about one and a quarter inch internal bore, and eighteen inches in length, connected by the small bent tube, 1, with the glass tube, B, which is cemented into the socket, 2, with its upper end open to the atmosphere. C, the wood-work for supporting the internal parts. D, is a plunger of hollow glass or other material, with the bottom end closed, and made to slide very freely in the iron chamber, A. E, is the standard by which the whole is supported and secured to the wood-work of the room or cabin. F, a circular ring within the arch, 3, of the standard, E, which, with the screw pivots, 4, 5, 6, 7, form the universal joint for preserving the perpendicularity of the instrument. In the standard, E, is a finely adjusted pulley, 8 and 9, another such pulley, 10, the cap of the plunger, D, from which an ear or staple to which a strong flexible silk cord, 12, is fastened, which passes over the pulley, 9, and thence over the pulley, 8. G, is the scale on which the knots per hour are graduated. O, is the zero point upon this scale, to which line and that intersecting, 11, on the iron cylinder, A, they are filled with mercury when the plunger is in its place, and floating at liberty upon the surface of the mercury. It will now be seen, that when the cord, 12, is pulled, the column of mercury will rise, in the glass-tube, B, as well as in that of A,

by the descent of the plunger, and consequent displacement of the mercury, and this in an equal ratio, as the degree of tension is increased. The drag to be towed overboard, for occasioning the resisting power, (which resistance will always correspond to the velocity of the vessel,) and for operating upon the instrument, as represented by the line 12, 12, fig. 1, connected therewith, and may be of various kinds as well as shapes. In some cases I have used merely a plain braided rope of 100 feet, or more, in length, and of the size of the common log line, which it is better to saturate with India-rubber, or other adhesive materials, to prevent wear. This plan I prefer for measuring currents of small velocities, and in shallow water; in other cases I have used a plummet of metal or glass, and which I have for some purposes found best, of the shape represented at A, fig. 4; if this be used about half the length of line only is requisite. But what I have found the most uniform and steady in action, and I should recommend as best for practice at sea, is a smaller line of about a quarter of an inch diameter, and 200 feet long, having a number of conical or egg-shaped plummets of metal, glass, or ivory upon it, at the extreme end from the ship, as represented at B, fig. 4, about three feet apart; twelve of these with a line of this length, at the speed of ten knots per hour, indicate six pounds avoirdupoise upon the pound and ounce scale of the instrument, or nine knots upon the scale of knots by the mercury. The pound and ounce scale is intended as a ready way of adjusting the instrument at all times, by proving it with such weights attached on shore. In this case, as with the other drags before mentioned, by shortening or lengthening the tow line, the proper length is readily ascertained for adjusting the column of mercury to the scale, and rate of sailing by measured miles, of any vessel, and which can always afterwards be adhered to.

It remains now to be shewn how the connection between the towing drag or plummets and the instrument

is effected. This, of course, depends upon where it is preferred to station and suspend the instrument, and from what part of the vessel to use the drags. If it be hung in the cabin, as represented at D, fig. 1, (and for which purpose it is very convenient on another account, hereafter described, for shewing the trim of the vessel), I prefer working the plummet or drag from the stern; and in order that the point of suspension of the cord, or line 12, be as near the surface of the water as possible, a hole is bored through the stern, in a slanting direction downwards, as near the middle of the vessel as may be, but avoiding the rudder. To prevent the line rubbing the sides of this hole, two pulleys, *f*, *f*, are inserted in the woodwork of the stern, outside, one above and one below, to take off the friction from the cord. From what has now been said, it will be evident that this instrument, as well as the next described, is equally applicable for measuring the velocities of currents themselves in the same way; but from fixed positions, as from vessels or boats moored in rivers, rapids, raceways of mills, from bridges, or even from boats at sea, where a heavy body is lowered to a great depth as a mooring, the strength and direction of a surface current may be easily ascertained. At E, fig. 1, is shewn the manner in which this instrument is made to answer another valuable purpose, that of shewing the trim of the vessel, as before observed, the perpendicularity being always maintained by its manner of suspension. I place immediately under it a strong table, *g*, *g*, having upon its surface a metal plate, *h*, being horizontally secured when the vessel is in perfect trim as to stem and stern as well as crosswise, or otherwise the best determined position for sailing. This plate has a centre point, *i*, which is placed precisely under the index point upon the instrument, D, and which is as near the plate as possible without touching it. The plate is divided into lines running at right angles with each other, one half longitudinally with the vessel, and the other at right angles

thereto; these lines or divisions are calculated to form degrees of a circle (the length of the instrument from its point of suspension, *k*, to the index point, *l*, being the radius), consequently shewing at all times the degrees of inclination, (if any) which the vessel has acquired from the perpendicular, or previously best determined sailing position.

Figs. 5, 6, and 7, represent another form of instrument, likewise for the purpose, which is more conveniently used upon deck than the before mentioned, as it may be placed upon the taffrail or even in the binnacle, by passing a bell wire under the deck to the stern, and attaching to this wire at the stern the same tow line and plummets, or what I prefer in all cases is the egg-shaped ivory balls, about twelve in number, placed three feet apart upon the end of the tow line; these balls have a hole through them longitudinally, which allows of their being strung upon the line, and a knot being tied on the line behind each of them, secures them all in their proper places; the smaller or pointed end being forward upon the line, prevents an accumulation of sea-weed or obstruction of any kind attaching itself.

Fig. 5, represents a plan or top view of the instrument entire, shewing the scale and index wire, which passes across the scale.

Figs. 6 and 7, shew the instrument with the cover removed. Fig. 6, is a side view, and fig. 7, a front view, and in both figures the same letters refer to similar parts. A, is the frame or bed of the instrument. B, is a barrel or arbor with its pivots supported in the raised parts of the frame, 1 and 2; upon this barrel, the inner end of the tow-line, 3, is wound a turn or two, and secured to it. 4 and 5, are weights fastened to the barrel, B, which occasion the necessary resistance, as they are more or less lifted by the partial revolution of the barrel, B, when the tow-line, 3, is pulled by being dragged through the water. 6 and 7, are other smaller weights, with the

arms, 8 and 9, for carrying the scale or card, D, upon which are marked the miles per hour, or knots. It must be observed, that these arms and weights are suspended upon, although loose and independent of, but act from, the same centre of gravity as the barrel, B, the pivots of which pass through them within the raised parts of the frame, 1 and 2. It is necessary for the perfection of the instrument that the distinct weights which govern the position of the scale or card and the index, should be freely and equally acted upon by gravity, although their relative weights are unimportant. The index-wire or point, *o*, is firmly fixed in the barrel, B, and passes over and across the card or scale, D, and is made to work as close to the scale as possible without touching it. It will now be seen that when the instrument is placed horizontally, or nearly so, in the stern of a vessel, whether in motion or not, that the card or scale will always find its true position by gravity, as steadily as the compass-card by polarity, and that as the barrel, B, with the weights attached to its under side, is more or less acted upon by the resistance of the water and the tow line, 3; so will the index, *o*, point out upon the scale (when properly adjusted) the number of knots or rate at which the vessel is sailing.

Having now complied with the proviso of the act which requires me fully to describe and ascertain the nature of my invention, and the various means by which it may be carried into effect, I shall now further state what I claim thereby to be protected in; viz., I claim as the first described apparatus, the general arrangement, and especially the reversed open-mouthed tube, as well as the double water-cistern; and in the second and last, the general arrangement of the instruments, together with the tow-plummet, conical, or otherwise, or a number of towing-plummets, a flexible rope, saturated with India-rubber, or other adhesive material, a close flexible chain, or in fact the towing of any body after or from a vessel for obtaining a resistance (not rotatory) for operating upon the herein

described instruments, or any other weighing instrument which might be used herewith on board of vessels for ascertaining their velocities, or by the same means in fixed positions for ascertaining the velocities of currents, whether they be in water or other fluids.—In witness whereof, &c.

Enrolled February 27, 1841.

Specification of the Patent granted to THOMAS HORNE, *of Birmingham, in the county of Warwick, Brass Founder, for Improvements in the Manufacture of Hinges.*—Sealed September 3, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye,* that in compliance with the said proviso, I, the said Thomas Horne, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My present improvement in the manufacture of hinges applies particularly to the process, manner, or method of making or manufacturing hinges from iron, and consists in the first place in an improved manner, mode, or method of preparing the strips or plates of iron of which the hinges are to be made, and also in the application thereof to the making of hinges, that is, the using up or working of the same; or in other words, cutting it up for the manufacture of hinges, and in the next place in improvements in further preparing the knuckle or thinner part of the said prepared plate-metal, or such parts of other plate-metal so previously prepared or cut into parts and intended to be converted into hinges, so as to enable a

better joint to be produced when the two halves or wings of the rings are fitted together. And lastly, in an improved means, manner, or method of producing the countersunk holes intended to receive the heads of the screws when the hinge is fastened in its required situation. And in order better to explain or illustrate the first and second parts of my present improvements, I do now refer to the specification of my former patent granted to me by his late Majesty King William IV. for "Certain improvements in the manufacture of hinges," bearing date the 24th day of July, 1835, the specification of which was duly enrolled in the Rolls' Chapel Office of the High Court of Chancery, on or before the 24th day of January 1836, in which specification it will be found that my then described "Improvements consisted in making hinges out of sheet-metal peculiarly prepared, of unequal thicknesses, by means of rolling, drawing, stamping, or swaging, so that the parts which are used to form the knuckles or joints shall be thinner than the parts used to form the flaps or wings of the hinges, and of turning over the said thinner parts of the metal into a rabbet or against a shoulder," in the manner therein described.

In the first place, as regards my present improvements, I would remark, that in my former specification above referred to, the groove or thinner part of the metal was described as being formed longitudinally in the strips or plates of metal, (that is to say,) as regards iron in the direction of the fibre (as it is commonly called and known to iron-workers and engineers) of the metal, and that when such iron was cut up, as described in my said specification, so as to form the two parts of a hinge, the fibres would still be in the same direction when the hinge was formed; whereas the first part of my present invention enables me to cause the fibres of the sheet-metal to be placed in a direction across the hinge, or at right angles, or nearly so, with its length, and this I effect by forming the grooves, indentations, or thinner parts, which

are intended to form the knuckles or joints at intervals across the piece, or plate, or strip of iron, which afterwards being separated to form the two parts of the hinge, will have the fibres situated across each piece, whereby I am enabled to turn the metal round to form the knuckles with greater ease and safety, and also to make a much stronger knuckle than when the fibres of the iron are placed longitudinally in the hinge. This will be better illustrated by reference to the drawings.

Description of the Drawing.

Fig. 1, represents a portion of the surface of the prepared sheet-iron, as described in my former specification, that is, with the groove or thinner part which is to constitute the knuckle formed longitudinally, or in a direction with the fibres of the metal, the direction of the fibre being shewn by dotted or waved lines on the figures; and,

Figs. 2 and 3, shew similar representations of portions of such plate-metal when separated for the purpose of forming the two parts of the hinge; and,

Figs. 4 and 5, are sections of the same, after the said thinner parts have been turned over, so as to form the knuckle or joint, *a*, *a*, being the thicker parts of the metal, or those intended to form the flaps or wings; and *b*, *b*, the thinner parts, or those to form the knuckles or joints; and,

Fig. 6, shews a portion of the iron roller, or otherwise prepared according to the first part of my present improvements, that is, with the grooves or indentations, or thinner parts formed crosswise of the fibres of the metal, or as right angles, or nearly so, to the longitudinal direction of the rolled metal; and,

Figs. 7 and 8, are representations of parts of the same separated from the piece in order to form the parts of a hinge.

Figs. 9 and 10, being sections of the same.

Figs. 11 and 12, shewing the same after being turned over to form the knuckle or joint; the waved or broken lines in these figures shewing, as in the former, the direction of the "fibre" of the metal; the red lines in fig. 6, shewing the line of separation of the metal. The black arrows shewing the direction in which the thinner parts of the metal are bent or turned over, to form the knuckle or joint. It will be seen that by my present improvements, the direction of the fibres of the iron are placed at right angles, or nearly so, to the length of the hinge, that is, they will, by my present improvements, be placed around the pin of the hinge in a direction crosswise to its axis, whereas they were by the former method placed longitudinally or parallel with it, or nearly so.

The second part of the present improvements consists in giving a pressure to the thinner or knuckle parts of the pieces of prepared metal, after they have been cut or separated from the piece or sheet for the purpose of further expanding these parts, so that when properly operated upon and finished by the workman, perfect or neat joints may be formed in the knuckles of the hinges; and I would here remark, that when the two pieces of metal, as figs. 2 and 3, or 7 and 8, are cut or stamped out of the sheet or pieces, that although these parts may nearly fit together while in the flat state, yet even then there would not be any metal left for the workman or finisher to file off, so as to make a perfect junction or close fitting joint. And further that when the thinner parts are turned round so as to form the knuckle, or even when working in ordinary plate-metal in such process, these parts in such operation become altered in the shape and do not make a perfect joint. Now in order to obviate this difficulty, I give this second pressure to the knuckle parts of the prepared metal of different thicknesses, or to the parts of ordinary plate-metal, for the purpose of widening or expanding these parts of the metal; and I thereby obtain a sufficient spread or width of the metal, to

enable the workman to remove the surplus parts in order to form the joints of the hinge perfect, either by punching, or cutting off, or filing, or other means, and thereby fitting the two parts together in a proper manner. This will be better explained by reference to the drawings.

Fig. 13, which is a representation of one portion of a hinge which has been operated upon by this second process of pressure on the indented metal, or the like effect upon the same parts of plain sheet metal, *a*, is the part to form the wing, and *b*, the parts to form the knuckle.

It will be seen that the sides of the parts, *b*, *b*, of the piece which are intended to form the knuckle are spread, cut or made wider by the additional pressure, so as to allow of a portion of the metal being removed by the workmen preparatory to the operation of jointing, which operation may be effected by the assistance of dies or stamping presses, or other suitable tools, as the manufacturer may think fit. This operation of the further pressing may be performed (either separately or in conjunction with the hereinafter described process of countersinking the screw holes), on either or both sides of the hinge.

The third improvement being the making or countersinking of the screw holes, I effect either before or after the holes have been punched out by the ordinary process, and I prefer operating with the metal hot when the countersinking is to be performed, after the screw holes have been first punched out of the pieces of metal when they were in a cold state, they are then heated in any suitable furnace; and I subject them to pressure, under any suitable fly or stamping press containing dies having proper shaped faces, and one of them furnished with suitable raised conical parts placed or formed thereon, so as to take into and act upon the several holes in the pieces or wings of the hinge.

Fig. 14, will serve to illustrate this part of my present

improvements, which figure represents a vertical section of a pair of dies furnished with suitable conical projections for effecting the purpose. A, is the upper die or ram, which in this instance has only a flat face or surface. B, is the lower or fixed die. C, represents one of the raised conical pieces fitted into or formed thereon; and D, the piece of iron prepared as hereinbefore described: that is with thicker and thinner parts, and consequently the face of the bottom die has a step or lower part formed in it. But in working with ordinary plate-metal this would not be required. The action of the dies when the two operations of pressing out the parts of the knuckles, and countersinking the hole is performed at once, is as follows: The piece of metal after being made hot is placed on the lower die, as shewn in the drawing, the conical pieces, C, being opposite the previously punched holes. The upper die or ram, A, is then made to descend, and by its pressure forces the piece of hinge-metal upon all the raised conical studs; at the same time, by the thinner or knuckle parts coming into contact, and under the pressure or operation of the parts, *a*, *b*, of the two dies, they will be expanded or spread out, so as to take such a shape or figure as that shewn at *b*, *b*, in fig. 13. The pieces are to be removed quickly, and the dies kept cool by any convenient means.

Another method of effecting these operations may be by performing the three operations at one time, that is, by punching the holes, then countersinking them, and compressing the knuckle parts.

Fig. 15, will serve to illustrate this method, which figure represents a section of a pair of dies. A, is the upper die, which in this instance has the step formed upon it to suit the figure of the metal, and also a punch, C, affixed to it, having a conical shoulder, *d*, intended to form the countersinking of the holes. B, is the lower or fixed die, and D, the piece of metal. The lower die has in this instance a hole or aperture, E, formed in it, to

allow of the discharge of the pieces of metal punched out by the descent of the punch, C, on the upper die or ram. The operation will be readily understood, for when the piece of metal is placed upon the lower die, and the upper one, A, descends, the punch, C, will first punch out a portion of the metal, and then, as the dies approach near to each other, the conical shoulder, *d*, of the punch will be forced into the hole previously made by its first part, and perform the operation of countersinking, while the parts, *a*, *b*, of the dies will press the knuckle parts of the hinge and expand them.

I would here remark, that the surface of the conical holes may afterwards be finished off by any rotary tool-cutter or punch, if required.

Having now described my present improvements, and some modes of carrying the same into effect, I wish it to be understood that what I claim as my present improvements, and secured to me by the above in part recited letters patent, is, firstly, the improved mode, manner, or method of preparing the strips or plates of iron for hinges, so that the fibres of the metal, as they are commonly termed, shall be laid or placed crosswise of the hinge.

Secondly, the expanding or spreading out of those parts which form the knuckle or joint of hinges which have been previously cut, parted, or separated by means of any description of press and appropriate tools, in order that there may be sufficient width of metal to enable a workman to form a close and neat or perfect joint.

And lastly, the operation of previously countersinking or first preparing the screw-holes by means of coned dies as herein described, instead of altogether cutting out those parts which admit the heads of the screws, by cutting-tools or drills (or what in the trade is termed countersinks), as generally used for that purpose. And I claim these several operations when effected either in combination or separately.—In witness whereof, &c.

Enrolled March 3, 1841.

Specification of the Patent granted to THOMAS BARRATT, *of Somerset, Paper Maker, for Improvements in the Manufacture of Paper.*—Sealed November 25, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—*Now know ye*, that in compliance with the said proviso, I, the said Thomas Barratt, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention relates, First, to the application of currents of air to paper, when being dried by cylinders heated by steam; and,

Secondly, my invention relates to the application of currents of air to cool the surface of paper, as it passes, after being sized, to the steam-drying cylinders. And in order that my invention may be fully understood, I will proceed to explain the drawing hereunto annexed.

Description of the Drawing.

Fig. 1, represents a section of the steam-drying cylinders, such as are now in use, for drying machine-made paper. A, A, are the steam-drying cylinders, the red line indicating the paper as it comes from the machine, in the state of "engine size or water leaf." B, B, are two pipes, having outlets, C, C, for the air, such outlets being spread into a wide narrow opening, as is shewn at fig. 2, in order to obtain a thin wide stream of air to sweep over the surface of the paper, and also on the endless felt, which is shewn by the blue line. D, is a reel, on to which the paper is wound. It will be seen that in each pipe, C, is placed a throttle valve, with an axis passing to the outside in order to regulate the blast of air to the

paper. The requisite blast of air through the pipes, B, C, may be produced by rotatory fans, or other blowing apparatus, which will readily be applied by a machinest capable of setting up the other parts of the machinery; and the pipes, B, may be brought from any position (depending on the locality) the convenience of the premises may require the blowing apparatus to be placed in. When the paper is to be "tubsized," or sized after it has been made, then I cause the paper from the reel, D, to pass through any of the mechanical sizing apparatus now used, and either to be wound on to another reel, and then to be dried by the steam-drying cylinders, fig. 3, or else to pass directly from the sizing to such cylinders, fig. 3; and either way in passing to steam cylinders, A^1, A^1, I cause the paper, first to pass over an open reel, E, which has a rotatory fan, F, within it, to which a slow rotatory motion is to be given, so that the paper will be slightly fanned as it passes round with the reel, E, such fanning process I find produces a similar effect to that obtained by the movement, when hand size parting is being performed on sheets; the fan having a cooling effect, acts advantageously on the animal matter of which the size is composed, and for such purpose the fan is not required to revolve more than about thirty times per minute, and I prefer that the air so fanned against the paper by the fan, F, should be as cool as possible, and for such reason where convenient, I apply a trunk to the end of the fan leading to an underground tunnel, though, where the room is well ventilated, this is not absolutely necessary. G, G, are rollers to carry the paper to the steam-drying cylinders; these drying cylinders have like pipes to those above described, applied for bringing currents of air against the paper, both as it is being dried by the steam cylinders, A, and also as it passes away, and is glazed by the rollers, H, H. I would remark that by such means of applying currents of air to paper, very advantageous results will be obtained in drying paper.

Having thus described the nature of my improvements, I would have it understood, that what I claim as my invention is, first, the mode of drying paper by applying streams of air to the surfaces, as the paper is being dried by steam cylinders, whether in the state of engine-size or water-leaf, or after sizing, as above described; and,

Secondly, I claim the application of currents of air to the surface of paper after sizing, in order to cool the size as the paper passes to the steam-drying cylinders, as described.—In witness whereof, &c.

Enrolled May 17, 1841.

Specification of the Patent granted to WILLIAM HIRST, *of Leeds, in the County of York, Clothier, for Improvements in the Manufacture of Woollen Cloth, and Cloth Made from Wool and other Materials.*—Sealed September 24, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—*Now know ye,* that in compliance with the said proviso, I, the said William Hirst, do hereby declare the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention relates to certain modes of fulling and milling cloths made of wool, or wool combined with other fibrous materials, which will felt therewith, or not prejudicially interfere with the felting properties of wool, and my invention more particularly relates to that description of cloth which is produced and milled, or fulled, without the fibres being first spun into yarn, and then woven in looms, that is, simply taking advantage of the properties

of such fibres interlocking and matting, called felting, by motion of the fibres amongst themselves; but part of my invention relates also to the fulling and milling of cloths of wool, or of wool and other fibres, which are made into yarn, and then woven into fabrics. And in order to give the fullest information in my power, I will proceed to describe the drawings hereunto annexed.

Description of the Drawings.

In manufacturing cloths of wool, or wool and other bres, when the process of spinning and weaving are dispensed with, it is necessary to obtain fabricated sheets of wool, or wool and other fibres, of even and equal thickness all over, and to fabricate such sheets to such an extent, or to such a degree of substance, that the same will not, by the after processes, be dragged out of figure, or state of evenness which may have been effected by the machinery by which such sheets of the cloth or fabric of fibre may have been made; and although the formation of such sheets forms no part my invention, I will describe the means I prefer for performing that part of the manufacture of woollen cloths, and cloths of wool, and other material; at the same time in doing so, I wish it to be understood that I do not confine myself thereto, as sheets of fibres made by other means may be fulled and milled, according to my invention.

Fig. 1, represents so much of a section of an ordinary scribbling machine, as will enable me to explain how I prefer to make sheets of wool, or wool and other fibres, in order to the sheets so made being in such a state of fabrication, as will be sufficient for undergoing the process of fulling and milling. The scribbling machine being well understood, and forming no part of my invention, it will not be necessary to enter into any description thereof, but simply to remark, that the sliver-roller, *a*, is enlarged, in order to obtain as large a sheet of fibres as conveniently can be; in other respects, the scribbling-machine, as above

stated, is of the ordinary kind, and in working of the machine, I cause as many layers of sliver to be combined together around the surface of the sliver-roller or cylinder, *a*, as will be required for cloth of the thickness desired; and I have found that forty-six layers of sliver, so made into sheets, makes a very strong thick cloth, but the quantities will be varied as the manufacturer may judge best for his purpose, and as is now the case in making like descriptions of cloths, and having obtained the requisite thickness of fabric or sheet of partially formed cloth on the cylinder, *a*, I cut the same off the cylinder, and according to the length I desire to have the cloth, with reference to the circumference of the cylinder, *a*, so I join two or more sheets together, by combing out the edges of the ends of such sheets, that the ends of two such sheets may lap over each other for a length of from one to three inches without varying the thickness at the joins from any other part, and when the two ends are so lapped on each other, I slightly press them, that the fibres at the edges may sufficiently combine to allow of the various sheets so joined, being wound on a roller, *b*, in one length, and then to be conveyed to the machinery for performing the first part of the process of fulling and milling, by condensing or compressing the fibres amongst each other, and thus cause them to interlock, and the sheet of fabric to have more strength.

Fig. 2, represents a section of a press by which the sheets are condensed and partially fulled, and the fibres caused to intermat by their felting properties.

Fig. 3, is an end view of the press complete, except that the guide-rollers are removed. *c*, *c*, is the framing of the press, the nature of which is clearly shewn in the drawing. *d*, *d*, are two hollow smooth surfaces or plates of cast-iron, so formed as to allow of being heated by steam, as is well understood in making such presses; but it is not absolutely necessary to heat such surfaces, although it is preferable so to do. *e*, is the steam-pipe for supplying

steam from an ordinary low pressure steam-boiler, the pipe, *e*[1], for supplying the upper hollow plate sliding in a stuffing-box, *f*, as is shewn. *g*, *g*, are supporting and guiding-rollers for the sheets of combined fibres; they turn easily in bearings at *h*, *h*. In fig. 2, a fabricated sheet or cloth of fibres on a roller, *b*, is shewn to be placed in the machine, and the end attached to the roller, *i*, on to which the fabric or other sheet is wound as it has undergone the process of pressure by the surface-press, and the workman in using the machine causes the upper and moveable plate, *d*, to descend and press the fabric between the two plates, *d*, *d*, and then he winds up a length equal to that which has been so pressed, by which means he brings a fresh quantity of the fabric between the surfaces which he next presses, and so on till the whole length of fabric from the roller, *b*, has been pressed and received on the roller, *i*, in which state it is in a condition to undergo the next process of fulling and milling, which is performed in the machine shewn at figs. 4 and 5.

Fig. 4, being a section of the machine; and,

Fig. 5, a side view thereof. The roll of fabric in the roller, *i*, is then covered with calico, and placed in a fulling and milling machine, which I will now describe. *j*, *j*, is a trough which has a false bottom, *k*, perforated with holes and a partition, *l*, as is shewn. *m*, being a steam-pipe, the under surface of which is perforated with holes; hence the steam descends between the sides of the trough and the partition, *l*. The roll of fabric is placed in the trough, having a fabric, *n*, *n*, which is affixed at the ends to rollers, *o*, *p*, and the fabric is wound on the roller, *o*, at the commencement, and unwound therefrom on to the roller, *p*, by the working of the machine, by which means the roll of fabric is constantly being moved round, so as to be pressed on at a different point of the circumference. *q*, is a plank of wood, which is raised and lowered by a screw, *r*, and by such means the roll of fabric is successively pressed on and then changed in its posi-

tion, and so on again and again, pressing and changing the position of the fabric, and by such means causing the fibres to intermat and felt, and the fabric or cloth to full and mill, and thus to complete the cloth ready for the finishing processes; and such fulling and milling is facilitated by being constantly in a bath of steam; and I would here remark, that although I prefer the machine now under description, and also the previously described machine to work in the manner of a screw or fly-press, it will be evident that the pressing operations of the surfaces, *d*, of the former case, and of the plank, *q*, of the present machinery, may be performed by other mechanical means. *s*, *s*, are two ratchet wheels affixed on the ends of the roller, *p*, and motion is communicated to such roller by the drivers, *t*, *t*, hinged to the plank, *q*, the ratchet-wheels being retained from turning back by clicks or catches, *v*, *v*, as is shewn.

I would here remark, that I have found it desirable in winding the fabric (to be milled and fulled) on to the roller, *i*, to wind with it a length of calico or other smooth fabric, in such manner as to keep the surfaces of the fabric to be fulled and milled from coming together, by which means the fabric may remain longer under operation without opening out and rewinding. And I have found, that by submitting the cloth of wool, or wool and other fibres to the operation of the second machine for an hour, that the same will have arrived at such a state as to allow of being unwound from the roller, *i*, and folded in such lengths of folds as to be capable of being put again into the trough, and the piece of cloth so folded I roll up in the way of the length of the folds, and wrap the roll in calico, or strong cotton fabric, or open canvass, and submit it again to the operation of the machine, till the fulling and milling process is complete to the extent desired by the manufacturer, or in place of completing the process of milling and fulling in such machine, the fulling and milling may be completed in the ordinary stocks.

The cloth is then to undergo the ordinary processes of finishing, which are well understood by woollen manufacturers; and in case of fulling and milling cloths made of yarn by this machine, the same process is to be observed.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood, that what I claim is, first, the mode herein described, of commencing the milling and fulling process on fibres fabricated into sheets, as described in respect to figs. 2 and 3 of the drawing; and,

Secondly, I claim the mode of carrying on the process of milling and fulling cloths of wool, or of wool and other fibres, as described in respect to figs. 4 and 5.—In witness whereof, &c.

Enrolled March 15, 1841.

Specification of the Patent granted to WILLIAM JEFFERIES, *of Holme Street, Mile End, in the City of Middlesex, Metal Refiner, for Improvements in Obtaining Copper, Spelter, and other Metals from Ores.*—Sealed July 1, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said William Jefferies, do hereby declare the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof (that is to say):—

My invention relates, first, to a mode of obtaining copper from copper-ore, and, secondly, to a mode of obtaining zinc from ores; and in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the processes pursued by me.

The modes of treating copper-ores by roasting and smelting, as at present practised, being well understood, and such being the case in respect to the furnaces employed for smelting, it will not be necessary to enter into a particular description thereof in this my specification, more particularly as my improvements are confined to the smelting process; and I prefer that the ores should be in the raw state, in place of submitting them to roasting or calcining previously to smelting; the ores may, however, be roasted or calcined before submitting them to the process of smelting according to my invention; and in order to assist me in the description of the improved process of smelting, I will suppose that a smelting-furnace has been at work according to the present mode, and in place of continuing the charge and working the furnace as heretofore, I charge it with raw ore (or with calcined ore), and when the same is in a smelted state, and has been well skimmed, I stir in to the melted mass a quantity of carbon or alkaline (preferring carbon) ground into a fine powder, and I continue to add such powder of carbon, till the mass in the furnace becomes dry and friable, and when the charge of the furnace is in this state, I push it towards the bridge. I then continue the heat until the mass is well melted, I then tap the furnace, and run off the metal into water, as is well understood, leaving the slag in the furnace, and charge again, and treat the charge with carbon or alkali, as above described, and so on continuously. I may, however, remark, that it is not necessary to tap and draw off the metal after each charge, as two or three charges may be made and treated with carbon or alkali before tapping and drawing off. The carbon I prefer for such processes is anthracite coal or charcoal, and when alkali is used, I prefer common soda, but I do not confine myself thereto. The metal thus obtained is to be subsequently treated in the same manner as metal in a like state of forwardness when obtained and worked in the ordinary mode, is now treated, all which is

well understood in obtaining copper from ores, and does not require any description in this my specification.

Description of the Drawings.

I will now proceed to describe the second part of my invention, which relates to a mode of smelting fine ores. The process of obtaining zinc from ores by roasting and smelting, as at present practised, being well understood, it will not be necessary for me to enter into any description thereof, my invention relating only to the mode of smelting, and consists in doing so in large ovens, externally heated, in place of the small inverted vessels, or the retorts now used, by which means I am enabled to smelt the ores on a large scale, and at very reduced expense, producing zinc of most excellent quality; and in order to make this part of my invention readily understood, I have annexed a drawing to this my specification, shewing the construction of an oven and furnace suitable for carrying out this part of my invention, and by which I can treat three or four or more tons of ore at one time, in place of having many small vessels or retorts in a furnace, and from the upper part, as well as from the lower part, of such oven I have several small pipes, *a, a,* descending into water contained in receivers, *b,* so that when distillation is going on, the metallic zinc evaporated will pass down such pipes, *a,* and be cooled. In constructing an oven for this purpose, it is important that the bottom and roof should be as thin as possible, to pass the heat freely through the fire brick, and yet the bottom of the oven should be strong enough to carry the charge of ore, and I make the fire-bricks of which the oven is constructed of a peculiar form, as is shewn in the drawing; by this means the bottom of the oven may be made of three inch brick, and the arch or top of the oven of two inch brick, and by such means I am enabled to make a very strong yet large oven and furnace, suitable for the purpose of

smelting zinc-ore. In working according to this part of my invention, I will suppose that the furnace and oven has been at work, and that the oven is ready again for having a fresh charge. I take the ore in the same state as usual, when working with the small vessels or retorts, as now practised; and I mix with such ore about five per cent. of small bituminous coal, and charge the oven as full as possible, and then close the mouth, and lute the same with fire clay, and continue the fire, and distillation will ultimately go on as when using small vessels or retorts, the metal as it is distilled passing down by the various pipes into the receivers; and it is important to remark, that as there are several pipes to conduct off the distilled metal, that none of those pipes should be left open to admit the atmospheric air. When the charge has been worked off, the mouth of the oven is to be opened, and the refuse remaining therein drawn out, and a fresh charge of ore immediately applied.

Having thus described the nature of my invention, and the manner in which the same is to be performed, I would remark, that although I have been thus particular in describing the exact means as pursued by me in performing my invention, yet I do not confine myself thereto, so long as the general character of the different parts of my invention, or either of them, be retained. But what I claim as the first part of my invention is the mode of smelting copper ores by treating the melted metal with carbon or alkali, as above described; and,

Secondly, I claim the mode of obtaining zinc from ores, by means of ovens, as herein described.

Enrolled January 1, 1841.

Specification of the Patent granted to JOHN RAPSON, *of Limehouse, in the County of Middlesex, Millwright, for Improvements in Paddle-Wheels for Propelling Vessels by Steam or other Power.*—Sealed November 3, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—*Now know ye*, that in compliance with the said proviso, I, the said John Rapson, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention relates to applying hollow vessels to paddle-wheels in place of the float-boards or paddles now employed, whereby in causing such hollow vessels to be immersed in the water by the rotations of the wheels, such vessels will offer greater resistance to the power of the engine, and thus cause the vessel to be propelled more advantageously, and the hollow vessels in passing the perpendicular when under the water will, by their levity, tend to rise to the surface of the water, thus requiring less of the engine's power heretofore requisite for raising what is called back-water ; and in order to give the best information in my power, I will proceed to explain the drawing hereunto annexed.

Description of the Drawing.

Fig. 1, represents the section of a steam-vessel having two paddle-wheels, constructed according to my invention, appiied thereto.

Fig. 2, is a side view of one of the wheels separately.

Fig. 3, shews a plan of one of the hollow vessels sepa-

rately, which I prefer to be of copper, but they may be made of any suitable materials; and,

Fig. 4, is a cross section of a wheel shewn separately. In each of these figures the same letters indicate similar parts, *a*, *a*, being hollow vessels, which I prefer to be of the shape shewn, as that shape will be found to enter and leave the water most advantageously. At the same time I do not confine myself to the precise form, so long as they are hollow, and consequently offer greater resistance when entering the water to the power of the engine or engines employed for propelling. *b*, *b*, shew the side-framings of the wheels; and *c*, *c*, the diagonal braces, to give stiffness to the outer framings of the wheels; for it will be seen that the main or paddle-shaft, *d*, does not pass to the outer framing. I would however remark, that if desired the shaft, *d*, may be longer, and have both the side-framings of the wheels affixed thereto. The hollow vessels are affixed to the side-framings of the wheel, as is clearly shewn in the drawing; and it will be evident that in using paddle-wheels constructed according to my improvements, the hollow vessels will act by their buoyancy, in place of the mere surface-action of float-boards or paddles of the construction heretofore used, which did not, when made of iron, in any way act by buoyancy, and when made of wood the quantity of buoyancy brought into operation has been of little value.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that what I claim is the mode herein described of constructing paddle-wheels by applying hollow vessels in place of the float-boards heretofore used.—In witness whereof, &c.

Enrolled May 3, 1841.

Specification of the Patent granted to WILLIAM HENRY FOX TALBOT, *of Lacock Abbey, in the County of Wilts, Esquire, for Improvements in Producing or Obtaining Motive Power.*—Sealed October 1, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said William Henry Fox Talbot, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention consists of three descriptions of engines, having this point in common; viz. that they all depend upon a voltaic or galvanic battery as their primary source of power.

Description of the Drawing.

First Engine.

A, fig. 1, is a strong metallic vessel partly filled with water, mixed with a little sulphuric or other acid, or with any other substance, which increases its conducting power, and facilitates its decomposition by the voltaic current. The upper part of this vessel is empty, and terminates in a cylinder, in which a piston, P, moves up and down; the upper end of this piston is attached by a rod and crank to a fly-wheel, in the usual manner. BCD, EFG, HIK, LMN, are four stout wires passing into the vessel at C, F, I, M, through holes in the metal, at which points the wires are to be surrounded, or cased with wood, cement, or any other substance which is a nonconductor of voltaic electricity, in order to prevent metallic contact

of the wires with the vessel itself; the wires are to be well secured in this situation, and the holes made air-tight. The wires, B, C, D, and H, I, K, both go to the same end of the voltaic battery, and their extremities, B and H, are soldered to it. Either end of the battery may be chosen for this purpose, but for the sake of clearness, I will suppose that they are fastened to the zinc end, and the other end of the battery I shall accordingly call the copper end. The wires, EFG, LMN, are separate from each other throughout their length, and each of them terminates in a metallic spring, which springs press upon the axis of the fly-wheel, at two different places; the extremities, D, E, of the upper wires are joined together by a fine wire of platina, D, E, which is above the surface of the fluid in the vessel. The wires, HIK, LMN, terminate in two disks or plates, K, L, of platina or other metal suitable for the purpose of electrodes or poles, for the decomposition of water. The fly-wheel revolves on a metallic axis, the ends of which are sustained by upright pillars or supports of metal; a stout wire, Y, Z, is fastened at one of its ends to one of these pillars, at its other end it is soldered to the copper end of the voltaic battery. The metal of the axis and that of the pillar are both kept bright, in order that a voltaic current may easily pass from one to the other; they are, moreover, kept in close contact by the weight and pressure of the fly-wheel and of the axis itself. In fig. 2, A, B, represents the axis, the extremity, A, of which communicates with the copper end of the battery by means of the wire, Y, Z, as just described. I have already said that the wires, EFG, LMN, (see fig. 1,) terminate in two springs, which press upon the axis at G, and N.

Fig. 3, is a section of the axis at the point, G, shewing the wire, EFG, pressing upon it, when the axis revolves each point of the circle, G, O, P, Q, passes successively under the end of the wire G, but in a certain portion of this circle, for instance in the arc, O, P, Q, the metal is cut out

and removed, and its place supplied with wood, ivory or any other substance which does not conduct voltaic electricity.

Fig. 4, is a similar section of the axis at the point N, shewing the wire, LMN, pressing upon it. When the axis revolves each point of the circle, N, R, S, T, passes successively under the end of the wire, N; but in a certain portion of this circle, for instance in the arc, R, S, T, the metal is cut out and removed, and its place supplied with any non-conducting substance (as before).

These arcs, O, P, Q, R, S, T, should be together equal to an entire circle, R, S, T, being the shorter of the two. Their positions should be exactly contrary to one another, so that when the middle point of the arc, O, P, Q, comes (during the revolution of the axis) to its highest position, the middle point of the arc, R, S, T, may be then beneath the axis and in its lowest position. The springs, G and N, are of the same length, and press on the axis at corresponding points, hence it is evident that whenever the spring, G, is pressing on the metallic surface of the axis, the spring, N, is then, on the contrary, pressing upon part of the wooden arc, R, S, T, and vice versâ; so that G, and N, can never be pressing both of them upon metal at the same time, nor both of them upon wood at the same time. This is the construction of the engine, the mode of its operation is as follows: the voltaic battery being sufficiently charged, and in good action, the axis is turned round by hand, until the spring, G, rests upon O, the beginning of the wooden arc, O, P, Q, consequently no voltaic current can then pass through the spring, G, into the wire, E, F, G. But at that moment the spring, N, of the wire, LMN, rests upon the point, T, the beginning of the metallic arc, T, R, consequently a voltaic current then passes, (the circuit being complete) from the zinc end of the battery, through the wire, HIK, from K to L, through the water (decomposing it by its passage,) then through the wire, L, M, N, and the spring, N, and through the metal of the axis from N, to A, finally from A, through the wire,

YZ, to the copper end of the battery. The voltaic current being thus completed, immediately the water begins to be decomposed, oxygen and hydrogen gases are evolved, which rise through the water and fill the space above the surface of the liquid, being there mixed at first with a little atmospheric air. This evolution of the gases continues during the greater part of the revolution of the axis, namely, until the point, R, the extremity of the arc, T, R, comes under the spring, N. The wooden arc, R, S, T, then succeeds, by which the current is interrupted, and the decomposition of water immediately ceases; but at the same moment, the spring, G, reaches, Q, the beginning of the metallic portion, Q, O, of its own circle, and consequently the current now passes through the wire, EFG, instead of passing through the wire, LMN, the course of the current is now as follows: from the zinc end of the battery, through the wire, B, C, D, and the fine platina wire, DE, then through the wire, EFG, through the metal of the axis from G, to A, and through the wire, Y Z, to the copper end of the battery. The current in passing through the platina wire, DE, heats it red hot, and this ignition of the wire causes the immediate explosion of the mixed oxyhydrogen gas, with which the wire is surrounded. The force of this explosion tends to drive up the piston, P, which is attached by a rod and crank to the fly-wheel; motion is thus communicated to the fly-wheel, and it is evident that during each revolution of the wheel, two operations occur in the vessel, A, first, the evolution of gas; and, secondly, the explosion of it, which explosion occurs always at similar periods, during the revolution of the wheel, at each of which periods the piston occupies the same place in the cylinder. The time of the explosion is regulated by the position of the wooden arcs, O, P, Q,—R, S, T, on the axis; these are, accordingly to be placed in that position, which is found by experiment to produce the greatest effect upon the piston.

I do not confine myself to the particular form of apparatus here described: and whereas in this engine the voltaic current is made to pass alternately through the water and through the wire, D E, by removing the metallic surface in some parts of the axis, and filling up its place with wood, which arrangement is one of the contrivances for changing the direction of voltaic currents which have been denominated commutators, I do not intend to confine myself to the use of a commutator of this form, but equally to employ any other one which produces a similar result.

I claim the method of obtaining motive power by the alternate evolution and combustion or explosion of oxyhydrogen gas or other inflammable gases, the said evolution being caused by the decomposition of a liquid by the voltaic current, and the said explosion or combustion being also caused by a voltaic current.

Second Engine.

A, B, C, fig. 5, is a cylindrical bar of soft iron, bent into the form of a horse-shoe. D, D^1, E^1, E, is a helix of copper-wire surrounding the bar, the coils of which are prevented from touching each other, or from touching the bar, by coating the wire with silk, or by any other equivalent means. The extremity of the wire, D, is soldered to either end of the battery. For the sake however of clearness in the description, I will suppose it is attached to the zinc end. It is well known that when a voltaic current passes through a helix of this kind the inclosed bar of soft iron becomes a magnet, and is capable of attracting a keeper or armature of iron placed in the neighbourhood of its poles. F, G, is a long lever, made as rigid and inflexible as possible. Its centre of motion, F, is situated as near to the pole, A, of the magnet as it conveniently can be. This lever carries the iron keeper or armature, H, which is firmly fastened to it, so that whenever the armature is attracted to the magnet, the free end, G, of the lever moves

through a space considerably greater than that through which the armature itself moves.

Fig. 6, is an enlarged view of the extremity, G, of the lever, shewing that it is pierced with a hole, I, through which a strong iron rod, K, L, passes, ending in a knob, K, larger than the hole, and coated with a non-conducting substance to prevent metallic contact with the lever. The rod, K, L, is attached to a crank on the fly-wheel, when, by the motion of this wheel the rod descends, it passes freely through the hole, but when it ascends the knob being too large to pass through the hole, catches in it, and lifts up the lever. The other end of the wire, E, (fig. 5), terminates in a metal spring, pressing upon the metallic axis of the fly-wheel at the point, E. Let the circle, E, M, N, (fig. 7), be a section of the axis at that point. Then during one revolution of the axis each point of the circle, E, M, N, passes successively under the spring, E. Let the metal be removed and its place supplied by wood (or other non-conducting substance) in a certain portion of this circle, for instance, in the arc, M, N. Furthermore, let a strong wire, Y, Z, be soldered to the copper end of the battery and to a metal pillar supporting the axis, both pillar and axis being polished, in order that a voltaic current may pass easily from one to the other, exactly as in the description of the first engine. Then it is evident that when the spring, E, presses upon any part of the wooden arc, M, N, no current can pass, but when it presses upon any part of the metallic arc, M, E, N, the voltaic current passes, its course being from the zinc end of the battery through the wire, D, D^1, E^1, E, then through the metal of the axis and pillar, through the wire, Y, Z, to the copper end of the battery.

Such is the description of the machine. In order to render its mode of action more intelligible I will first suppose that the spring, E, is lifted up from the axis and the wheel turned round by the hand. In that case the voltaic current is interrupted, and the bar, A, B, C, acquires no

magnetism. By the action of the crank the rod, K, L, rises and falls alternately. When it rises it passes through the hole, I, till the knob, K, catches in the hole, after which it lifts the lever to a certain height. When it falls the lever falls with it through a certain space, but can fall no lower, because the armature, H, comes in contact with the bar, A, B, C, which stops its motion, and consequently the motion of the lever. The lever being thus stopped, the rod, K, L, continues its downward motion by passing through the hole, I: it then rises again as before. The point at which the knob, K, catches against the lever in its ascent, should be nearly the middle point of its whole motion of ascent and descent.

This being understood, let us now suppose the battery to be charged and in good action, and the spring, E, to be in its place, pressing upon the axis of the fly-wheel. The wooden arc, M, N, must be placed upon the axis in such a position that the spring, E, may quit it and come upon the metal arc at a moment shortly after the knob, K, has reached its highest point and is beginning to descend, consequently the spring now pressing upon the metal, the voltaic circuit is complete, the current passes through the helix, and the bar, A, B, C, becomes a magnet. The armature, H, being then nearly at its greater distance from the magnet, is attracted to it, and in its descent pulls down the lever, to which it is rigidly and inflexibly attached. The lever pulls down the rod, K, L, and communicates motion to the fly-wheel. When the armature comes in contact with the magnet its motion stops, and that of the lever also. At that moment the rod disengages itself and presses downwards through the hole, I. At the same moment the spring, E, quits the metallic arc, N, E, M, and enters upon the wooden arc, M, N, the lengths of the arcs being adjusted on purpose to obtain this effect. The voltaic current immediately ceases, and the magnetism of the bar, A, B, C, ceases or greatly diminishes. The armature, H, is now only retained on the bar by its own

weight, or by a feeble removal of the magnetism. The knob, K, pursues its downward course, and then rises again till it catches in the hole, I, when it raises the lever by virtue of the momentum which the fly-wheel has acquired without any opposition from the magnetism of the bar, A, B, C, which has ceased. The knob, K, continues then to lift the lever till it has passed its highest point and begins to re-descend, at which moment (as before) the spring, E, quits the wooden arc for the metallic one, the bar becomes again a magnet and again pulls down the armature, lever, and rod, and gives another impulse to the fly-wheel. A similar succession of actions then continues.

When the voltaic current is stopped there sometimes remains a trace of magnetism in the iron bar. If it is wished to get rid of this more effectually, the current may be reversed two or three times in quick succession, and then afterwards stopped (instead of being stopped at once) by means of any of the contrivances for the reversal of voltaic currents, now well known by the name of commutators, all other parts of the machine remaining exactly the same.

I do not claim any thing as new in the way in which the iron bar is magnetized and demagnetized.

In order to explain clearly what I claim as a new invention in this machine, I will point out in what respect it differs from the electro-magnetic machines which have been heretofore constructed. In these it has been usual so to arrange the parts, that the armatures pass by the magnets with a tangential motion, never coming into contact with them, or if coming into contact (as was the case in some of the earliest contrivances), then being wholly stopped by them to the great loss and sacrifice of the power of the machine, the whole motion of the machine having to begin afresh after every such stoppage. Now, the novelty of my machine consists in this, that the armature upon which the magnetism acts is but a small part of the whole mass set in motion, that whole mass consisting of the

armature lever-rod, K, L, and the rest of the engine; but more especially the fly-wheel, the weight of which may be augmented *ad libitum*. The armature itself is stopped by coming in contact with the magnet, and the lever is likewise stopped, but with this exception, all the rest of the engine continues its motion, owing to the rod, K, L, disengaging itself from the lever, as has been already explained. Therefore, what I claim as new is this, that in this electro-magnetic engine there is such a disposition of parts that the armature (whose motion sets in motion the fly-wheel and the rest of the engine) approaches the magnet almost in a direct line, and is stopped by it, but that the greater part of the mass moved disengages itself at that instant, and continues its motion by its own momentum, till it receives a fresh impulse from the returning magnetism of the bar. I claim, then, the disengaging the armature from the rest of the engine at the proper moment for obtaining the above mentioned effects. I do not confine myself to the particular form of machine which I have here described, and which I have selected for description on account of its simplicity; but my invention extends to all such electro-magnetic machines as contain the principle I have above stated, the stopping of the armature itself by the magnet, and the disengagement at that moment of the rest of the mass in motion.

Variation in the Second Engine.

In the description of this engine, I have supposed that the armature, H, was finally fixed to the lever, F, G. It may, however, be moveable, as represented in fig. 8.

In fig. 8, the armature, H, instead of being fixed, drops into a socket or cavity, P, Q, R, S, in the lever, F, G, which is represented in section. The armature is prevented from dropping through the cavity or socket by the jutting parts, P, Q. When the armature is in its place, having fallen to the bottom of the socket, its lower surface is in the same place with the lower surface of the lever. It is

evident, from this arrangement, that when the bar, A, B, C, fig. 1, is magnetized, the armature, H, pulls down the lever. But when the armature is stopped, by coming in contact with the magnet, the lever is not stopped, but continues to move downwards, the armature being thereby lifted up in its socket. The two poles of the magnet must be smaller than the armature, and so near to each other, as to be able to pass through the opening in the lever. By a similar arrangement several electro-magnets may be combined, so as to act upon the same lever. It will be sufficient to represent two such magnets in combination, whence the arrangement of a greater number will be easily understood.

Fig. 9, is a section of the lever, F, G, having two sockets or cavities, into which the armatures, marked 1 and 2, are dropped; and when in their places, their lower surfaces are in the plane of the lower surfaces of the lever. Two horse-shoe electro-magnets, marked 1 and 2, are placed transversely to the lever (that is, the line joining their poles, is at right angles to the length of the lever). In the figure only one branch of each magnet is represented, but the other will be understood to be behind it, by reason of the perspective of the drawing. The essential part of the arrangement consists in the following point, viz. that the magnet, No. 2, is placed lower, or further from, the lever, than No. 1. The coils or helixes of wire, which surround the two electro-magnets, are connected together, and form part of the same voltaic circuit, in order, that when the current passes, both of them may be magnetized simultaneously. The two armatures being dropped into their sockets, let the voltaic circuit be completed immediately the armature, No. 1, is attracted by its magnet, No. 1; but the armature, No. 2, is not at first sensibly attracted by the magnet, No. 2, by reason of its greater distance from it. The armature, No. 1, comes into contact with its magnet, and in so doing, it pushes down the lever so far, that the armature, No. 2, is

brought within the attraction of magnet, No. 2. Consequently, the armature and magnet, No. 2, are drawn into contact, this not being at all impeded by the first armature, No. 1, which is lifted up in its socket. In the same way, a third armature and magnet may be drawn into contact, the two first armatures (1 and 2) being in such case both lifted up in their sockets. Similarly, a series of electro-magnets may be combined, so as to act upon the same lever, each of which is placed lower than the preceding (or farther from the lever) by small gradations of distance. The rest of the description of the second engine is applicable to this variation of it, without any alteration.

The contrivance exhibited, in figs. 8 and 9, admits of many other forms; and I do not intend to confine myself to this one only, which I have selected as being one of the simplest. I claim the employing of the mutual attraction of an armature and magnet, so as to bring a second armature and magnet within the influence of their mutual attraction (the first armature being stopped without impediment to the action of the engine), and similarly the employing these two first ones to bring a third armature and magnet within the influence of their mutual attraction, and so on in succession for any larger number, thus augmenting the (otherwise small) distance to which magnetic attraction (of a powerful kind) extends itself.

Third Engine.

Figs. 1, A, B, C, is a strong iron-tube bent or re-curved, the lower part of it is filled with mercury, oil or any other convenient liquid, which rises in the two branches of the tube to D and E. P, is a piston which fits closely to the tube, and is attached by a rod and crank to a fly-wheel. It is plain, that if a sufficient force is applied, and then withdrawn again, at regular intervals, on the surface of the mercury at E, forcing it downwards, that the fluid in the other branch would push the piston upward, and

communicate an impulse to the fly-wheel. In order to obtain through pressure upon the mercury at E, the upper part of the tube, C, is to be filled with any liquid which possesses the property of being greatly dilatable by heat, or with any compressed gas or air; the end, C, is then to be firmly closed. One of the simplest modes of proceeding, is to fill the tube with carbonic acid in a frozen state, in which state it is inert, and may be introduced without any difficulty. An iron cap is then to be screwed down upon the end of the tube, C, and strongly secured. The acid will soon afterwards liquify, and if there be room, it will in part or wholly assume the gaseous state. Whatever be the expansible substance employed, it will exert pressure upon the piston at all times; and if the fly-wheel were moved round by the hand, the piston in its descent would be retarded, and in its ascent equally accelerated by the pressure of the expansible substance, so that no advantage would accrue from the use of the latter. But if, during the ascent of the piston, the expansible substance be kept warmer than during the descent, it will exert a greater pressure during the former than the latter, and the difference of the two pressures will be a force available for working the engine. The rest of the description, therefore, relates to the mode of producing this warmth in the expansible substance at the proper times.

Fig. 2, shews the end of the tube, C, on a larger scale. FG, HI, are two stout wires passing through the tube at G and H, at which points they are surrounded with a non-conducting substance to prevent metallic contact with the tube. Their extremities are joined by a spiral wire of platina or other metal, or by a thin plate of any suitable metal. The wire, F G, is soldered to the zinc end of a voltaic battery. The wire, HI, terminates in a spring, I, pressing upon the metallic axis of the fly-wheel. This axis communicates with the copper end of the battery by a stout wire, Y Z, passing from that end to a metallic pillar supporting the axis, as in the two former engines.

Fig. 3, is a section of the axis at the point, I, shewing the spring, H I, pressing upon it. During a revolution of the axis each point of the circle, I K L, passed under the spring, but during a portion of the revolution (as from K to L, for instance) metallic contact is suspended by removing the metal in that part, and filling up its place with wood. This wooden arc is so placed on the axis that metallic contact may take place during the ascent, and be suspended during the descent of the piston; then during the ascent of the piston the voltaic current passes, heats the wire or band of platina, G, H, and thus communicates warmth to the internal parts of the expansible substance and expands it, and during the descent of the piston this heat gradually diminishes in the wire, G, H, and in the expansible substance in contact with it.

I do not confine myself to this particular form of engine, nor to this particular kind of commutator; but I claim the method of obtaining motive power by the pressure of gas or liquid, or the vapour of a liquid, or any of these combined, such pressure being caused by heat communicated to them internally, and then withdrawn or diminished at regular intervals by means of a voltaic battery.—In witness whereof, &c.

Enrolled April 1, 1841.

Specification of the Patent granted to Bernard Aubé, *of Coleman Street Buildings, in the City of London, Gentleman, for Improvements in the Preparation of Wool for the Manufacture of Woollen and other Stuffs, and in the Process of Obtaining the Materials to be used for that Purpose.*—Sealed May 7, 1840.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Bernard Aubé, do hereby declare the nature of

my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof (that is to say):—

In preparing wool for the manufacture of woollen and other stuffs, it is well known that large quantities of oil are used to facilitate the working of the wool in the preparatory processes through which it passes, and the descriptions of oil used are expensive. Now the objects of my invention are to use oleic acid, which is comparatively a cheap article of manufacture, possessing properties peculiarly adapted to the preparatory processes through which wool passes; and also by washing wool containing oleic acid in an alkaline solution, there will be a saponaceous product obtained applicable to the fulling of woollen cloth, which I prefer to oleic acid, following the ordinary processes by which the oleic acid would be washed away, in like manner to what is generally the case when washing and pressing out the oils used, and as heretofore practised.

I would here remark, that oleic acid is a fluid well known, and is the fluid product or acid obtained from fatty matters, when the two acids composing fatty matters are separated, and such separation is now largely practised by persons engaged in the manufacture of what are called stearine candles, and the various processes for separating the acids are well known, and form no part of my invention; and oleic acid may be purchased in large quantities, particularly from manufacturers of stearine candles. And in carrying out my invention, in place of using oils I use such fatty acid called oleic or tallow oil, and using the same intimately with the wool in a similar manner to that usually resorted to when employing the oils now used; and the workman will judge by the working of the wool whether he has applied sufficient oleic acid or not, in the same manner as he now judges whether he has applied sufficient oil, by the manner in which the wool under operation works, because it is well known that different wools require different quantities of oil, and

therefore no exact quantities can be given, and different workmen use more or less oil in working the same descriptions of wool. All that will therefore be necessary to state is, that in using oleic acid for the oils now employed, the workman will judge by the freedom with which he can work the wool, and will use more or less of the oleic acid. When removing the oleic acid from the wool or fabrics made therefrom, it may be accomplished by the same means as heretofore practised when the oils now employed have been used; but I prefer that the water used should have an alkali dissolved therein, so as to convert the oleic acid into a saponaceous product, which will be found particularly useful for fulling woollen cloths in place of soap; and for this purpose I dissolve about one half by weight of soda of commerce (which is the alkali I prefer, but I do not confine myself to that alkali,) of the weight of the oleic acid known to have been used in preparing the quantity of wool which is now to be treated, and such quantity of alkali is to be dissolved in a quantity of water about twice the weight of the wool to be cleansed. Although I am thus particular in giving quantities, I do not confine myself thereto, as they may be varied, but the quantities stated are those which I have used. By thus using an alkaline solution as the material for washing out the oleic acid from the wool, in addition to getting rid of the oleic acid, I also, as above stated, obtain a product very suitable for fulling woollen cloths.

Having thus described the nature of my invention, I would have it understood that what I claim is, first, the mode of preparing wool by the use of oleic acid in such processes;

And secondly, I claim the mode of preparing wool by the use of oleic acid when combined with the removing it therefrom by means of an alkaline process, as described. —In witness whereof, &c.

Enrolled November 7, 1840.

Specification of the Patent granted to HENRY MARTIN, *of Norton Terrace, Camden Town, in the County of Middlesex, Painter, for Improvements in Preparing Surfaces of Paper.*— ealed March 30, 1840.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Henry Martin, do hereby declare the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof (that is to say) :—

My invention relates, first, to a mode of preparing surfaces of paper, by combining thereon a coating of oil-paint with subsequent embossing.

Secondly, my invention relates to a mode of preparing surfaces of paper, in the manufacture of paper-hangings, by combining thereon a coating of oil-paint, and afterwards printing or producing thereon the required pattern for paper-hangings.

Thirdly, my invention relates to a mode of preparing surfaces of paper, by combining thereon a coating of oil-paint, and subsequent glazing or planishing; and,

Fourthly, my invention relates to a mode of laying on a coating of oil-paint on paper by means of rollers.

And in order to give the best information in my power, I will proceed to explain the process as performed by me, and which I have found fully to answer. And I will first explain the means pursued by me for obtaining a coating of oil-paint on paper, in order that it may be finished by other process, in order to fulfil the objects of my invention; and it is important that the coating of paint should be as even and smooth as possible; and the paints I employ are those usually applied in house-painting, and of such colour as it is desired the paper should assume.

It is well known, that in the use of oil-paint, as it is employed in the common and usual way of painting with

a brush on any surfaces, and especially when employed on a surface of paper, that certain disagreeable appearances are visible when such surfaces are examined, the surface having a degree of coarseness; and this renders the use of oil-paint objectionable, as a fit material for practical purposes on paper, where a good surface of colour is required. I therefore employ means to overcome these objections, and to render the surfaces of paper in preparing them with oil colour, fine and smooth, and of a more agreeable appearance. I take a sheet, or piece of paper, plain or tinted; for example, a piece of paper, twelve yards long, or of other convenient length, and I lay this on a flat table of the length and breadth of the paper. The paper may be sized or not; if sized, one or two coats may be given, using either common or superior size for the purpose. The preparation of the paper by painting I prefer to be done by one of the two modes hereafter explained, that is either by the usual manner of ordinary house-painting; and in this operation I use the common paint brush, and with this I work out the oil colour as evenly as possible. Immediately after this, I take a brush of a small size, having a surface of a moderate degree of hardness, as a clothes or shoe-brush, with which I rub or scour, in a light manner, all over the painted surface, giving the brush a circular motion, so as to obliterate the marks of the paint-brush. I then take a dry brush, known as a softener, it being generally made of a long fine hair, that of a badger is best; and I pass this softener lightly over the painted surface, which gives it an additional smoothness. If more than one coat of paint is put on, this process should be repeated. But as I sometimes use paper having a tinted or coloured ground, produced from coloured pulp, or by the subsequent application of water-colour; in such cases, I consider one coat of paint sufficient, provided such tint resembles, or is made suitable for, the colour of the paint, which is to be

applied, and such tint, in fact forms a preparation for the oil colour; or,

Secondly, by preference, I lay the oil paint or colour on to the paper, by passing the paper between two rollers, together with an endless felt or other fabric. This felt, in its revolution, is supplied with oil colour, as it passes into a trough and under a roller, partly immersed in the oil-paint or colour therein, a scraper being placed to act upon the felt, as it descends, to prevent it being too much charged with oil paint or colour, and serving to keep the supply of colour regular. The paper may be passed between the rollers in this manner two or three times, according to the quantity of colour it may be deemed necessary to lay on. By this mode of laying on the oil paint, I produce a fine and regular surface. Having obtained paper, coated with oil paint, by the above, or such like means, I submit it, when dry, to the operation of embossing, by passing it between properly engraved rollers, or I use dies, as is well understood. By this means I am enabled to produce embossed papers, having a very rich surface, far superior to paper when simply embossed, without a coat of oil paint, and applicable to various useful purposes. In manufacturing paper-hangings, the paper having received its coating of oil paint of the colour the ground or surface is intended to be, it is next to be printed by blocks or other surfaces, as is now generally practised and well understood, or such surfaces as are suitable, when simply printing paper, with or without a coloured surface of distemper or water-colour. By this means I am enabled to obtain paper-hangings of great beauty, and such as will allow of being washed when hanging on walls or other surfaces. When making paper-hangings in imitation of marble, I prefer to resort to that mode wherein the design is produced on a liquid, as is well understood, and I prefer to take the impression on to the painted surface of the paper before that painted surface is

dry; by this means the effect will be improved, as it allows of softening off by a brush. As to that part of my invention, by which I produce a glazed or enamel-like surface on paper, previously coated with oil paint, I use plain or tinted, or water-colour undergrounds, as may be deemed convenient. The oil-colour surface being laid on by the above or other suitable means, the oil paint being such as is used for flatting; but I prefer, as respects this class of papers, to use the oil-colour or paint in a thick or round state, and it should be thinned wholly with turpentine, in the same manner as if to be used for flatting. After the oil-paint has been put on the paper, and some time has elapsed to allow of the turpentine to evaporate, the colour becomes set, and will allow a smooth knife to be passed over without injuring the surface, and when it is in such state, it is to be glazed as early as possible; for this purpose I lay the paper upon a woollen cloth, or cotton-velvet, or other similar soft material, to form a firm but soft bed. I then take a pallet-knife or a trowel, having a smooth or polished surface, and lay it flat on the painted surface of the paper, and pass it along with a slight pressure; the colour being set it yields to the pressure, and a glaze is thereby produced; or other means may be resorted to for glazing. When the surface is dry, it may be heightened by the well known means used for glazing or planishing, or the paint on the paper may be dry before planishing. And I may here remark, that such prepared and planished or glazed papers will be found to offer a beautiful surface to receive impressions of copper and other plate engravings, also for paper-hangings and other purposes.

Having thus described the nature of my invention, and the manner in which the same is to be performed, I would have it understood that I do not claim the applying a coat or surface of oil-colour on paper generally, nor do I claim the printing or producing suitable designs or patterns on paper when not previously coated with oil-paint or oil-colour; nor do I claim embossing papers when not previously

coated with oil-paint or oil-colour; nor do I claim planishing or glazing paper when not coated with oil-colour or paint, such processes being well known and in use; but what I claim is, first, the mode of preparing surfaces of paper by combining thereon a coating of oil-paint with subsequent embossing, as herein described.

Secondly, I claim the mode of preparing surfaces of paper in the manufacture of paper-hangings, by combining thereon a coating of oil-paint, and afterwards printing or producing thereon the required pattern, as herein described.

Thirdly, I claim the mode of preparing surfaces of paper by obtaining thereon a coating of oil-paint, and subsequently glazing or planishing the same, as herein described.

And fourthly, I claim the mode of producing a coating of oil-paint on paper by means of rollers, as herein described.—In witness whereof, &c.

Enrolled September 30, 1840.

Specification of the Patent granted to SAMUEL HILL, *of Sloane Street, Chelsea, in the County of Middlesex, Gentleman, for Improvements in the Making of Bread and Biscuit.*—Sealed March 25, 1840.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Samuel Hill, do hereby declare the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof (that is to say):—

My invention relates to a mode of making bread and biscuit by combining with the use of the materials now employed certain matters not heretofore so used in combination; and in carrying out my invention, firstly, I use

flour of wheat, of rye, of barley, of Indian corn, or of rice, which are the ingredients which are now and have long been the matters generally in use in England for making bread and biscuit; and my invention consists in combining with one or more of such ingredients one or more of the following ingredients:—arrow-root, or tapioca, or cassava, or sago, or millet, or flour from the kittul-tree, or corokan seed, or the fruit of the Palmyra-tree, or sougee. With four parts of one or more of the first mentioned ingredients I mix one part of one or more of the ingredients, and when rice is employed as one of the first mentioned, I apply from one-sixth to one-eighth portion of rice in respect to the other of the first mentioned ingredients, and I steam the rice before I use it, or it might be done by simmering with hot water, or only ground into flour; but I greatly prefer steaming, as it will thereby make lighter bread. I then adopt the usual mode of kneading the mixture or combination into dough and ferment it with yeast, allowing a sufficient time for the dough to rise; it is then formed into loaves and baked in the usual way of making bread when only one or more of the first mentioned ingredients are used. In making brown bread I also occasionally mix a small portion of cocoa with the warm water used in mixing the dough made of the other ingredients, about sufficient to colour it; and as there is so much more saccharine in some of the ingredients than wheaten flour, it produces a good bread.

The ingredients herein specified, and not hitherto so made use of in the making of bread, contain starch, gluten, gum, and saccharine; and although they would not make good bread alone, yet when they are combined with the first mentioned ingredients they improve the quality of the bread by rendering it more wholesome and digestible; and as some of the ingredients are cheaper than wheaten flour, the bread made by this combination would reduce the price. I do not claim as a novelty the use of any of the first or second

mentioned ingredients, when separately considered, for making of bread, but only the combining them, or some one or more of each of the two classes of ingredients mentioned in the heads firstly and secondly. And I may remark, that the bread will be found to have another good quality,—it will keep much longer than other bread.

In making biscuits, I prefer dough from the two classes of ingredients; and after this preparation, the biscuits are made in the usual manner, and baked in a hot oven: and I occasionally mix a small portion of cocoa with the warm water used in kneading the dough, about sufficient to colour it, as in making of bread. The combination of steamed rice, with other ingredients, containing more saccharine than wheaten flour, which corrects its harsh and adhesive qualities, is an improvement in the making of biscuits, and they will also be cheaper and highly nutritious.

Bread for Horses, Cattle, Sheep, Pigs, Calves, Dogs, and other Animals.

I make a coarse bread without yeast or leaven, by a combination of a variety of ingredients, consisting of maize (commonly called Indian corn meal), oat meal, rye meal, malt dust, grain, sago, paddy rice, cassava, potatoe, flour, bean meal, pea meal, brewer's grains, poomak, corokan, prinatto, and make two or more of them into bread, with water. Beer, liquid from the distillers, jelly made of jaffna moss, oil and fat, or graves, either separately or jointly, according to the quality of bread required. The proportions may be varied. I generally compose a dough of about four of the different ingredients, in nearly equal proportions. This bread is nutritious for different animals, and much more portable than hay and corn. I steam, simmer, boil, or prepare, with hot water, many of the ingredients before they are made up to put into an oven for baking.—In witness whereof, &c.

Enrolled September 25, 1840.

Specification of the Patent granted to THOMAS MAC-GAURAN, *of Golden Terrace, Pentonville, in the County of Middlezex, Gentleman, for Improvements in the Manufacture of Paper from a Material not hitherto so employed.*—Sealed August, 26, 1840.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Thomas MacGauran, do hereby declare that the nature of the invention communicated to me is fully described and ascertained in and by the following description thereof (that is to say) :—

The invention consists in manufacturing paper from the hop-bine, which may be used as a substitute for the pulp of linen or other rags, or it may be used mixed with linen rags, or any other suitable material, if desired.

I will now describe the mode of preparing the bine, in order to render it suitable for the manufacture of fine paper. I take the bine after the hops are removed, and after bruising the stalk by passing it through rollers, or by any of the ordinary means (used for bruising hemp and other fibrous plants), and cut it into small pieces of one or two inches long. I then place these pieces to soak in rain or river water, where they should be allowed to remain immersed in water for about twenty-four hours; they are then to be well washed, without breaking the pieces, in the ordinary washing-engine (that being well known to paper-makers, I have not thought it necessary to describe it), this washing should continue until the water passes away perfectly clear: during this part of the process the roller should not touch the plate. When it is well washed I stop the water from passing through, and let down the roller on to the plate, and beat the bine until no splints or white chips appear. It is then to be taken to a press and to be subjected to pressure until nearly dry. It is then to be put into a cistern, which I prefer

should be of stone or lead, containing chloride of lime; and I use about 10 lbs. of chloride of lime to 100 lbs. of bine, in which it should be immersed for twenty-four hours. It is afterwards cleansed from the chloride of lime by a stream of water passing through the cistern. It is then to be subjected to the operation of an ordinary beating-engine. The rougher the surfaces of the blade and plate of such engine is, the better. It is then tuturated and beaten into an impalpable pulp. I take this pulp and submit it to the same process as just described. It will then be in a fit state to be manufactured into fine paper. In making coarse paper the process is the same as above described, with the omission of that part of it which applies to the reducing it to an impalpable pulp, that not being necessary. The paper may be bleached by any of the ordinary well known means.

Having thus described the nature of the invention and the manner of performing the same, I would remark that I do not confine myself to the mode herein described of preparing the bine, though I believe it to be the best for the purpose; but what I claim as this invention is the manufacturing paper from the hop-bine, either by itself, as a substitute for linen or other rags, or it may be mixed with them, or other suitable material, for the purpose of making paper.—In witness whereof, &c.

Enrolled February 26, 1840.

PATENTS GRANTED FOR SCOTLAND,

From May 24, to June 22, 1841.

Edward Henshall, of Huddersfield, in the county of York, Carpet Manufacturer and Merchant, for certain improvements in making, manufacturing, or producing carpets and hearth-rugs.—Sealed May 24, 1841.

William Petrie, of Croydon, in the county of Surrey, Gentleman, for a mode of obtaining a moving power by

means of voltaic electricity applicable to engines, and other cases where a moving power is required.—Sealed May 24, 1841.

MOSES POOLE, of Lincoln's Inn, in the county of Middlesex, Gentleman, for improvements in the manufacture of fabrics by felting. Communicated by a foreigner residing abroad.—Sealed May 24, 1841.

WILLIAM JOEST, of Ludgate Hill, in the City of London, Merchant, for improvements in propelling vessels. Communicated by a foreigner residing abroad.—Sealed May 24, 1841.

ANDREW M'NAB, of Paisley, in the county of Renfrew, North Britain, Engineer, for certain improvements in the manufacture of bricks.—Sealed May 26, 1841.

CHRISTOPHER NICKELS, of York Road, Lambeth, in the county of Surrey, Gentleman, for improvements in the manufacture of matresses, cushions, paddings, or stuffings, and in carpets, rugs, and other napped fabrics. Partly communicated by a foreigner residing abroad.—Sealed June 1, 1841.

JOHN CLAY, of Cottingham, in the county of York, Gentleman, and FREDERICK ROSENBORG, of Sculcoates, in the county of York, Gentleman, for improvements in arranging and setting-up types for printing.—Sealed June 3, 1841.

SIR SAMUEL BROWN, Knight, of the Royal Hanoverian Guelphic Order, Commander in her Majesty's Navy, of Netherbyres House, Ayton, in the county of Berwick, for improvements in the means of drawing or moving carriages and other machines along inclined planes, railways, and other roads, and for drawing or propelling vessels in canals, rivers, and other navigable waters.—Sealed June 4, 1841.

WILLIAM BROCKEDON, of Queen Square, in the county of Middlesex, Esquire, for a composition of known materials, forming a substitute for corks and bungs.—Sealed June 9, 1841.

John Lambert, of No. 12, Coventry Street, in the parish of Saint James, within the liberty of the city of Westminster, Gentleman, for certain improvements in the manufacture of soap. Communicated by a foreigner residing abroad.—Sealed June 10, 1841.

Richard Laming, of Gower Street, Bedford Square, in the county of Middlesex, Surgeon, for improvements in the production of carbonate of ammonia.—Sealed June 14, 1841.

Joshua Field, of Lambeth, in the county of Surrey, Engineer, for an improved mode of effecting the operation of connecting and disconnecting from steam-engines the paddle-wheels used for steam navigation —Sealed June 16, 1841.

Andrew M'Nab, of Paisley, in the county of Renfrew, North Britain, Engineer, for an improvement or improvements in the making or constructing of meters, or apparatus for measuring water or other fluids.—Sealed June 21, 1841.

Joseph Maudslay, of Lambeth, in the county of Surrey, Engineer, for improvements in the arrangement and combination of certain parts of steam-engines, to be used in steam navigation.—Sealed June 21, 1841.

John Condie, of Blair Iron-Works, Ayr, in the kingdom of Scotland, for improvements in applying springs to locomotive and railway and other carriages.—Sealed June 22, 1841.

George Richards Elkington and Henry Elkington, of Birmingham, in the county of Warwick, for improvements in coating, covering, or plating certain metals. —Sealed June 22, 1841.

Moses Poole, of Lincoln's Inn, in the county of Middlesex, Gentleman, for improvements in producing and applying heat. Communicated by a foreigner residing abroad.—Sealed June 22, 1841.

LIST OF NEW PATENTS.

George Bent Ollivant and Adam Howard, of Manchester, Millwrights, for certain improvements in cylindrical printing machinery, for printing calicoes and other fabrics, and in the apparatus connected therewith, which is also applicable to other useful purposes.—Sealed June 5, 1841.—(*Six months.*)

John Mee, of Leicester, Frame Smith, for improvements in the manufacture of looped fabrics.—Sealed June 5, 1841.—(*Six months.*)

William Hannis Taylor, of Lambeth, Esquire, for certain improvements in propelling machinery.—Sealed June 5, 1841.—(*Six months.*)

Joseph Gibbs, of the Oval, Kennington, Civil Engineer, for certain improvements in roads and railways, and in the means of propelling carriages thereon.—Sealed June 5, 1841.—(*Six months.*)

Miles Berry, of Chancery Lane, Patent Agent, for certain improvements in machinery or apparatus for ruling paper. Communicated by a foreigner residing abroad.—Sealed June 5, 1841.—(*Six months.*)

James Colley March, of Barnstaple, Surgeon, for certain improved means of producing heat from the combustion of certain kinds of fuel.—Sealed June 8, 1841.—(*Six months.*)

Henry Richardson Fanshawe the Younger, of Hatfield Street, Christ Church, Chemist, for improvements in curing hides and skins, and in tanning, washing, and cleansing hides, skins, and other matters.—Sealed June 10, 1841.—(*Six months.*)

John George Bodmer, of Manchester, Engineer, for certain improvements in machinery for propelling vessels on water, parts of which improvements apply also to steam-engines to be employed on land.—Sealed June 10, 1841.—(*Six months.*)

Edward Hammond Bentall, of Heybridge, Essex,

Iron Founder, for certain improvements in ploughs.—Sealed June 10, 1841.—(*Six months.*)

Robert Adam, of Salford, Engineer, for certain improvements in hydraulic presses.—Sealed June 12, 1841.—(*Six months.*)

James Wills Wayte, of the Morning Advertiser Office, Fleet Street, Engineer, for certain improvements in machinery or apparatus for letter-press printing.—Sealed June 12, 1841.—(*Six months.*)

John Anthony Tielens, of Fenchurch Street, Merchant, for improvements in machinery or apparatus for knitting. Communicated by a foreigner residing abroad. Sealed June 12, 1841.—(*Six months.*)

George Claudius Ash, of Broad Street, Golden Square, Dentist, for improvements in apparatus for fastening candles in candle-sticks.—Sealed June 12, 1841.—(*Six months.*)

Edward Palmer, of Newgate Street, Gentleman, for improvements in producing printing surfaces, and in the printing china, pottery-ware, music, maps, and portraits.—Sealed June 12, 1841.—(*Six months.*)

Ezekiel Jones, of Stockport, Mechanic, for certain improvements in machinery for preparing, slubbing, roving, spinning, and doubling cotton, silk, wool, worsted, flax, and other fibrous substances.—Sealed June, 12, 1841.—(*Six months.*)

Alexander Horatio Simpson, of New Palace Yard, Westminster, Gentleman, Peter Hunter Irvine, and Thomas Eugeen Irvine, both of Charles Street, Hatton Garden, Philosophical Instrument Makers, for an improved mode of producing light, and of manufacturing apparatus for the diffusion of light.—Sealed June 17, 1841.—(*Six months.*)

Thomas Walker, of North Shields, Engineer, for improvements in steam-engines.—Sealed June 18, 1841.—(*Six months.*)

William Petrie, of Croydon, Gentleman, for im-

provements in obtaining mechanical power, which are also applicable for obtaining rapid motion.—Sealed June 19, 1841.—(*Six months.*)

JOHN HAUGHTON, of Liverpool, Clerk, Master of Arts, for improvements in the method of affixing certain labels. —Sealed June 19, 1841.—(*Six months.*)

JAMES HENRY SHAW, of Charlotte Street, Blackfriars, Jeweller and Watchmaker, for improvements in setting wheat and other seeds.—Sealed June 19, 1841.—(*Six months.*)

SIR SAMUEL BROWN, Knight, of Netherbyers House, Ayton, Berwick, for improvements in the means of drawing or moving carriages and other machines along inclined planes, railways, and other roads, and for drawing or propelling vessels in canals, rivers, and other navigable waters.—Sealed June 19, 1841.—(*Six months.*)

JOHN GEORGE TRUSCOTT CAMPBELL, of Lambeth Hill, Upper Thames Street, Grocer, for improvements in propelling vessels.—Sealed June 19, 1841.—(*Six months.*)

JOSEPH GAUCI, of North Crescent, Bedford Square, Artist, and ALEXANDER BAIN, of Wigmore Street, Cavendish Square, for improvements in inkstands and inkholders.—Sealed June 21, 1841.—(*Six months.*)

WILLIAM WALKER, the Elder, of Standish Street, Liverpool, Watch Finisher, for an improvement or improvements in the manufacture of the detached lever watch.—Sealed June 23, 1841.—(*Six months.*)

ROBERT STEPHENSON, of Great George Street, Westminster, Civil Engineer, for certain improvements in the arrangement and combination of the parts of steam-engines of the sort commonly called locomotive engines.—Sealed June 23, 1821.—(*Six months.*)

JOHN GODWIN, of Cumberland Street, Hackney Road, Piano-Forte Maker, for an improved construction of pianofortes of certain descriptions.—Sealed June 23, 1841.—(*Two months.*)

JAMES SIDEBOTTOM, of Waterside, Derby, Manufac-

turer, for certain improvements in machinery or apparatus for preparing cotton and other fibrous substances for spinning.—Sealed June 23, 1841.—(*Six months.*)

William Chesterman, of Burford, Oxford, Gentleman, for improvements in filtering liquids.—Sealed June 23, 1841.—(*Six months.*)

George Thomas Day, of Upper Belgrave Place, Pimlico, Gentleman, for an improved apparatus for creating draft, applicable to chimnies and other purposes.—Sealed June 23, 1841.——(*Six months.*)

John Henry Le Keux, of Southampton Street, Pentonville, Engraver, for an improvement in line engravings, and in producing impressions therefrom.—Sealed June 23, 1841.—(*Two months.*)

Miles Berry, of Chancery Lane, Patent Agent, for a new or improved engine, machine, or apparatus, for producing or obtaining motive power by means of gases or vapours produced by combustion. Communicated by a foreigner residing abroad.—Sealed June 23, 1841.—(*Six months.*)

John Lee Stevens, of King Edward Street, Southwark, General Agent, and John King, of College Hill, Printer, for certain improvements in candle-sticks and other candle-holders. — Sealed June 25, 1841.—(*Six months.*)

THE

REPERTORY

OF

PATENT INVENTIONS.

No. XCII. NEW SERIES. — AUGUST, 1841.

Specification of the Patent granted to James Walton, *of Sowerby Bridge, Halifax, in the County of York, Cloth Dresser, for Improvements in the Manufacture of Beds, Mattresses, Pillows, Cushions, Pads, and other articles of a similar nature, and in Materials for Packing.*—Sealed May 12, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—*Now know ye*, that in compliance with the said proviso, I, the said the James Walton, do hereby declare that the nature of my said invention, and the manner in which the same is to be practised and carried into effect, are described in manner hereinafter expressed and appearing.

My invention consists first, of a mode of manufacturing and constructing of beds, mattresses, pillows, cushions, pads, and other articles of a similar nature, by an assemblage or combination of elastic air-vessels or cells, either connected together externally, or enclosed within a common covering, or both, as hereinafter described.

Secondly, in the application of such elastic air-vessels, either connected or unconnected with each other, to

the purpose of packing articles of a delicate or fragile nature.

And thirdly, my invention consists of a mode of making air-vessels for the manufacture of beds, mattrasses, cushions, pads, and articles of a similar nature, and for packing, by forming such air-vessels by means of dies, and exhausting the air from the external surfaces of the caoutchouc from which the vessels are produced. My invention having for its objects the use and application of accumulations of small elastic air-vessels as stuffing materials; and for the purposes of my said invention, I generally employ hollow balls, or globes, or vessels of other shapes of Indian-rubber filled with atmospheric air, as forming the most convenient elastic air-vessels for those purposes; and, I shall therefore, in the first place, describe, with reference to the figures contained in the first three sheets of the annexed drawings, the means and apparatus by which I construct such air-vessels of Indian-rubber. In all the drawings, as well in the first three as in the fourth and last sheet, the same letters of reference are employed to denote the same parts in the several figures contained in one and the same sheet, but not in different sheets.

Description of the Drawing.

In sheet 1 of the annexed drawings, fig. 1, is an elevation of an apparatus for making hollow globes or balls of Indian-rubber, by the force of condensed air inflating the Indian-rubber; and,

Fig. 2, is a section of a part of the above; and,

Fig. 3, is a plan of part of the underside of the lever, *d*, shewn in figs. 1 and 2, hereinafter referred to.

In figs. 1 and 2, *a*, is an air-tight metallic vessel of suitable strength, into which air is to be condensed by an air-pump, connected with it by a pipe, *b*. *c*, is a cock fixed to the upper part of the vessel, *a*. The top or end of the cock is turned smooth, and so as to present either

a flat or curved surface, upon which the lever, *d*, moving on the joint, *e*, bears, when not lifted up. This lever is cut down or hollowed out where it bears upon the top of the cock, *c*, for the purpose of holding the Indian-rubber tight and fast, and it is perforated with a conical hole, *f*, fig. 3, concentric with the top of the cock, *c*. If the top of the cock, *c*, is curved, the hollowed part of the lever may be formed on a curve of a smaller radius, so as to impinge on only one point or line round the curved surface of the cock, and so leave the Indian-rubber above that line free to expand when subjected to the force of the condensed air as after mentioned. The mode of manufacturing the Indian-rubber globes or balls by means of this appparatus is as follows. The air is to be condensed into the vessel, *a*, by a pump of the ordinary construction. A sheet of Indian-rubber is laid on the top of the cock, *c*, and pressed down by the lever, *d*, and the cock is then opened and a sufficient quantity of the condensed air allowed to pass through to force the rubber through the conical hole, *f*, and expand it into a thin ball or globe, as shewn in the drawing at *g*, fig. 2. When the ball is expanded as much as required, according to the intended size and strength of the ball, the cock is shut, and the neck of the ball is then closed by tying it tightly with thread close to the upper surface of the lever, *d*, at the opening, *f*. The ball is then removed by lifting the lever, *d*, and the refuse rubber is cut off. In order better to confine the air contained in the ball, a little Indian-rubber cement may be applied to the edges of the rubber where cut off, and by compressing the same together, they will be firmly united and the ball will be completed; but when it has been made from such rolled or prepared Indian-rubber as hereinafter mentioned, it should be kept for one or two months to acquire due toughness before it is used for the purpose of my invention.

It will be obvious that instead of using the vessel filled with condensed air, the air-pump may be applied direct by

affixing it to the cock, *c*, and the air forced through, by which means the same result will be produced, but I prefer the use of a vessel filled with condensed air as being more convenient. The thickness of the sheets of Indian-rubber used, will of course depend upon the intended size and strength of the inflated ball, and on the quality of the Indian-rubber employed. For making separate balls, in the manner I have described, I prefer the use of new bottle Indian-rubber, which I steep in warm water, 90° to 100° of Fahrenheit, for several hours, and afterwards in cold water for several days. The bottle being cut through before steeping, and after being so steeped, the layers of Indian-rubber of which a bottle is composed, may easily be separated, and will be ready to be inflated into balls. But I make no claim to this blowing balls of Indian-rubber as above described, my invention consisting in the application of such balls.

In the same sheet of drawings 1, figs. 4 and 5 represent an apparatus for making the India-rubber balls by a different process;

Fig. 4, being an elevation; and,

Fig. 5, a section of part of the same. *a*, is an air-vessel similar to that shewn in fig. 1, but from which the air is to be exhausted, and thus causing the India-rubber to be pressed into dies. *b*, is the exhausting pipe. *c*, the cock. *h*, *h*, are hemispherical cups or dies connected by a hinge, *i*; one of these cups is fixed on the top of and communicates with the cavity of the cock, *c*, and the other is connected to and communicates with it by a flexible tube, *j*.

To manufacture the Indian-rubber balls by means of this apparatus, the air-vessel, *a*, is to be first exhausted by a air-pump or other means. The cup or dies are opened into the position shewn in fig. 5, and a sheet of Indian-rubber is stretched tightly over both the cups. The cock, *c*, is then opened, and the pressure of the atmosphere acting on the surface of the rubber expands or forces it into the cups or dies, until it comes into contact with the

inner surfaces, during which operation the edges of the Indian-rubber must be held down by hand or other convenient mode, to prevent the air from getting into the cup underneath the Indian-rubber, and also to prevent the Indian-rubber from being depressed into the cups without being expanded. The cups are then closed, as shewn in fig. 4, when the surfaces of the Indian-rubber covering the edges of the cups or dies, are brought into contact, and adhere so as to form a ball. The refuse Indian-rubber is then cut off round the external edge of the cups or dies, and the cups being opened, the balls or other shaped vessels so produced in their complete state, may be removed and kept for future use.

Here again it is obvious that if the air-pump be applied direct to the cock, and the air by that means drawn out of the cups or dies, the same result will be produced, but I prefer the intervention of the exhausted vessel, *a*, as more convenient for use.

In sheet 2, figs. 1, 2, 3, and 4, represents an apparatus for forming a number of balls at one time, connected together in sheets.

Fig. 1, is a plan; and,

Fig. 2, is a section of the apparatus when opened.

Fig. 3, is an elevation; and,

Fig. 4, is a section of the apparatus when closed. *a*, *a*, are two plates of metal connected together by a hinge, *b*, and in each of which plates are cut out several hemespherical or other shaped recesses, *c*, *c*, *c*, *c*, the situation of the recesses in one plate corresponding with those in the other. *e*, *e*, are two air chambers, formed one within each of the plates, and connected together by the flexible tube, *d*. *f*, fig. 1, is a tube by which the air may be extracted from both chambers, and also from the hemespherical recesses through the holes or passages, *g*, *g*. To manufacture the Indian-rubber balls by this apparatus, a sheet of Indian-rubber is to be stretched over each of the plates, whilst the apparatus is open, as in figs.

1 and 2, and confined by a small metallic frame fitting over the Indian-rubber into a step or shoulder, cut round the plates, as shewn in the drawings, to hold the Indian-rubber close to the plates, and thereby prevent the air from entering into the recesses. The air being then exhausted from beneath, by the like means as hereinbefore mentioned, through the tube, *f*, the pressure of the atmosphere will expand the Indian-rubber, and force it into the recesses, as shewn in section, fig. 4, where the yellow line indicates the Indian-rubber. The apparatus is then to be closed as in figs. 3 and 4, when the surfaces of the portions of Indian-rubber between the recesses will be brought into contact by the closing of the plates, and will adhere to each other. The portions of Indian-rubber expanded over the surfaces of the corresponding recesses, in the upper and lower plates, will thus be united at the edges, and form spheres or balls, or other shaped vessels, depending on the dies within which the air will be confined. The plates, *a*, *a*, and the recesses therein may be made of any dimensions, according to the size required, and the number and size of the balls to be made, and the form of the recesses may be varied, so as to form either hemespherical cups or halves of other figures, agreeably to the wish of the manufacturer. Although I use and have referred to an air-pump as the instrument of exhausting the air from cups, or recesses, or dies, in this and the previously described apparatus, the same effect may be produced by any other efficient method of exhausting the air, as by the condensation of steam in connected vessels, or other well known methods.

In sheet, 3, fig. 1, is a plan; and,

Fig. 2, an elevation of the apparatus last described, in connection with a further apparatus for coating the insides of the balls with cotton, flock, or other similar material, to prevent the insides of the balls from adhering together in case of collapse. *a*, *a*, is the apparatus delineated in sheet 2, and hereinbefore described. *b*, is

a plate of metal which may be either detached or affixed to one of the plates, *a, a,* by a hinge, as shewn in the drawing, and sufficiently large to cover both the plates, *a, a.* The plate, *b*, is perforated with holes, *d*, corresponding in position and dimension with the recesses in the plates, *a, a,* at the surface of the plates. After the sheets of Indian-rubber are laid on the plates, *a, a,* and the air exhausted, the plate, *b*, is placed on the face of the Indian-rubber, and the cotton, flock, or other similar matters used, is strewn on through a sieve. The plate, *b*, covering the portion of the sheets of Indian-rubber between the recesses, and which are intended to adhere, prevents the cotton flock from falling on those portions, whilst the insides of the hemespherical portions of Indian-rubber are completely coated with it. The sheets of Indian-rubber used in the process of making connected balls or vessels, by means of the apparatus delineated and shewn in sheet 2, and before described, may be cut from blocks, or be made from prepared or rolled Indian-rubber. For this purpose good clean Indian-rubber well washed, and freed from extraneous substances, is mixed with naptha or other solvent in the proportions hereinafter mentioned; and these ingredients are then worked in a mortar, until they become completely incorporated. The mass is then in a fit state for rolling into sheets by smooth metal rollers, which is well understood, which when in action ought to be heated to from 80 to 100 degrees of Fahrenheit. The proportions of the Indian-rubber and solvent which I generally employ are, two parts of rubber to three of solvent, but these may be varied, or the rubber may be prepared without any solvent, but will require more working in the mortar, the quantity of working required being in inverse proportion to the quantity of solvent used. The sheets then formed will be very adhesive, and the parts intended to come in contact in forming the balls or vessels, will readily and firmly adhere, but when the sheets are cut from blocks or prepared in other

ways, not producing the sheets in a sufficiently adhesive state, then those parts of the surfaces of the sheets which are intended to be united should be covered with a little Indian-rubber cement, which may be applied by means of a roller covered with cloth or other suitable material for imparting the cement, or by any other convenient mode.

I shall now proceed to describe, with reference to the figures contained in the fourth and last sheet of the annexed drawings, a mode of using the Indian-rubber balls or vessels for the purposes of my said invention.

In sheet 4, fig. 1 is a plan, and fig. 2 an edge view or elevation of a bed or cushion formed of Indian-rubber balls or air-vessels. *a, a, a, a, a*, are a series of sheets or connected layers of balls. The red lines indicate the portions of the Indian-rubber sheets which adhere in forming the balls by means of the apparatus delineated in sheet 2, and before described, and which connect the balls or other shaped air-vessels. *b, b, b, b*, are thin sheets of Indian-rubber, or other air-tight material, laid alternately between the sheets of balls. *c, c, c, c*, are stronger sheets of Indian-rubber which enclose the whole, and to which the edges of the sheets, *a, a, a, a, a*, and *b, b, b, b*, must be well cemented by Indian-rubber cement, so that not only the external covering, or Indian-rubber sack, of the whole bed or cushion, *c, c, c, c*, may be air-tight, but also each distinct chamber between any two of the Indian-rubber sheets (indicated by the lines in fig. 3) may be air-tight. By this means if any of the balls burst the air will still be confined in the tier or chamber to which it belongs, so long as the sheets which form the chamber remain perfect. The bed or cushion thus constructed may then be enclosed in a covering of bed-tick or other fabric.

The mode above described of protecting the balls by intervening sheets of Indian-rubber or other air-tight material, will much add to the durability of the bed or cushion so made.

For the manufacture of beds and other stuffed articles

I generally use Indian-rubber balls of from one to two inches in diameter, but the size of the balls for this and other purposes must depend on the taste or fancy of the manufacturer.

Fig. 3, is an elevation of a cushion or bed which is formed of layers of sheets of balls without intervening layers of sheets of Indian-rubber, in all other respects it is formed the same as the one described above. If unconnected balls are used they may be either enclosed between layers of sheets of Indian-rubber to confine and protect them, or they may be put loosely into such covering or receptacle as it is wished to fill. The sheets of balls may also be used without either the external or internal sheets of Indian-rubber or other air fabric, but without such sheets they will be more liable to injury, though they will allow a more free circulation of air.

It is obvious that beds and other articles as above-mentioned, manufactured in the manner described by me, are much more free from liability to serious injury than such articles would be if consisting of a single large air-vessel, any injury to such, causing a rent or perforation, allows the escape of all the air, and the article is rendered useless; whilst should one, or even several, small air-vessels burst, no material injury is occasioned. When sheets of air-tight material are interposed between the layers of air-vessels, it is evident the air which may escape from a burst air-vessel will still be confined within the chamber formed by the surrounding sheets, or within the outer air-tight covering, if no intervening sheets are used; and should the sheets or outer covering be ruptured or punctured the escape of air will be partial and inconsiderable, unless a great number of the air-vessels be burst. The liability to such accidents is greatly diminished by the reciprocal pressure and support of the adjacent balls or air-vessels, by which means the force of any external pressure is distributed among the balls, and the pressure on each in great measure equalized, except

as to those next adjacent to the external covering, and which have consequently the least support.

The balls, either in sheets or single, may be applied to the stuffing or filling of beds, mattresses, cushions, pillows, or for pads and other articles of a similar nature.

The small Indian-rubber balls or vessels are also applicable to packing, in substitution or in aid of materials now used for such purposes, by means of which articles, such, for instance, as plate-glass or instruments, or machines or other articles, and things of nice construction, or easily liable to injury to their parts, may be packed, and such packing may either be by enveloping them in sheets of air-vessels or surrounding them by a sufficient quantity of unconnected balls or other shaped air-vessels, the yielding and elastic nature of which would protect the articles packed therein from injury by shaking, percussion, or otherwise (except in cases of extraordinary violence), and the packing itself would not chafe or injure the articles enclosed. And when packing with such sheets of air-vessels, they would furnish an air-tight and water-tight covering when required, by causing the edges to be joined or cemented by Indian-rubber cement. The objects of the invention being to obtain lightness and elasticity in packing or padding the articles or things requiring to be packed or padded; and such is the case in stuffing beds, mattresses, pillows, cushions, and pads, and other articles of a similar nature. I would, in conclusion, remark, that the using of such accumulations of small elastic air-balls or other shaped vessels, as a means of stuffing and packing, the modes of doing so will require to be varied, and the workman, aided by the description herein given, will readily make such variations as the shapes and sizes of the articles may require, and he will cover the beds, mattresses, pillows, and other articles, made according to my invention, with any fabrics or covering his taste may dictate.—In witness whereof, &c.

Enrolled November 12, 1840.

Specification of the Patent granted to JOHN BAPTIST WICKES, *of Leicester, Frame-Work Knitter, for Improvements in Machinery employed in Frame-work Knitting, or Stocking Fabrics.*—Sealed May 30, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye,* that in compliance with the said proviso, I, the said John Baptist Wickes, do hereby declare that the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention relates to a mode of applying needles to the needle-bars of machinery employed in frame-work knitting, or stocking fabrics, whereby a workman will be able to narrow his work in the progress of making with greater facility than heretofore, and according to my invention, the needles, where the narrowing of the work is to take place, are made capable of being moved up out of action by their being placed on an axis and capable of movement thereon. And in order to give the best information in my power, that a workman may readily carry out my invention, I will proceed to describe the drawing hereunto annexed.

Description of the Drawing.

The construction of stocking or frame-work knitting machinery being well understood, it will not be necessary for me to enter into a description thereof; I will, therefore, confine my explanation to the application of my invention thereto.

Fig. 1, shews the section of so much of the parts of an ordinary stocking frame as will, together with the other figures, enable me to explain the nature of my improvements.

Fig. 2, is a front view of part of the needle-bar, with leads of needles applied thereto, part of the needles being raised.

Fig. 3, is a plan of fig. 2, all the needles being down in their horizontal position, as they would be when all in work.

Fig. 4, is a section of the needle-bar, shewing the means of replacing the raised needles into their horizontal position. The other figures of the drawing shew the needles and their springs separately. *a*, is the ordinary needle-bar. *b*, one of the lead sinkers. *c*, one of the jack sinkers. *d*, is the thread-carrier, by which the workman places the thread on the needles to the width desired.

Fig. 5, shews one lead of needles, *e*, separately; and,

Fig. 6, shews a plan and side view of one of the leads of needles, *f*, separately. The only difference in the two leads of needles, *e*, *f*, is, that one is made capable of being turned up out of the way of the .thread-carrier, and the other is not, as will readily be seen by examining the drawing. It will be evident, that in using the needles, *e*, in a frame, that they will only necessarily be required to an extent at each side of the machine, equal to the extent of the narrowing, but if preferred, all needles, *e*, may be used, the advantage to be derived from so doing is, that different widths of fabrics may be made in the same machine, which could not be the case when leads of needles, *f*, are used. *g*, is the axis, which runs through all the leads, *e* and *f*, the leads, *e*, being capable of moving thereon, as is shewn in the drawing. *k*, *k*, are springs, one to each of the leads of needles, *e*; and they are so formed, that when the needles are horizontal, the spring of each lead of needles, *e*, presses on the back of the web, e^1, but when the needles are raised out of the horizontal position, the spring of each lead so raised will press on the front of the web, e^1, and in both cases the springs will retain the needles securely. *k*, is a rod proceeding

from end to end of the length of needles on the needle-bar. *i*, is a lever moving on axis affixed on the needle-bar, there being a similar lever or an axis affixed at the other end of the rod, *k*, and the rod, *k*, is affixed to such levers. At the back end of each of the levers, *i*, are formed two notches, into which the ends of the springs, *j*, enter; and when the rod, *k*, is required to be raised up, the end of the springs, *j*, enters into the notches, and when the levers, *i*, are down in a horizontal position, then the ends of the springs, *j*, enter into the back notches, and the springs, *j*, in either case will retain the rod, *k*, secure.

Having thus explained the nature of the parts as shewn in the drawing, I will describe the mode of working, and in doing so I would remark, that the parts of the machine, as shewn, indicate that there are two inches of moveable leads of needles, *e*, on each side of the division of the needles of the frame in which the fabric is produced, and, consequently, the work might be narrowed two inches or less on each side, but this extent of leads, *e*, used, and also their place on the needle-bar, may be varied. Supposing the machine to have been at work with all the needles in the horizontal position, as shewn at fig. 3, and that it is desired to commence narrowing the work: the workman would tickle off the loops of the two outermost needles on each side of the work, as is well understood; and he would then turn up such outermost needles out of the way of the thread-carrier, whereby there would be no thread laid on to those outermost needles, and he would turn up such outermost needles by first lifting the levers, *i*, and then raise the outermost needles, so that they would be held out of the horizontal position by their springs, and the workman will from time to time proceed in like manner, as he progressively requires again and again to narrow his work.

Having thus described the nature of my invention, I would have it understood that I am aware that it is not new to remove needles of stocking-frames out of the way

of the thread-carrier, by sliding them back in a horizontal position, in order to facilitate the narrowing of the fabrics produced thereby, I do not, therefore, claim such means of narrowing generally; but what I do claim, is the mode of applying needles to the needle-bars of machinery employed in frame-work knitting and stocking fabrics, whereby they may be turned out of action by moving on an axis, as described.—In witness whereof, &c.

Enrolled November 30, 1840.

Specification of the Patent granted to HUGH UNSWORTH, *of Blackrod, in the County of Lancaster, Bleacher, for Improvements in Machinery or Apparatus for Mangling, Drying, Damping, and Finishing Woven Goods or Fabrics.*—Sealed August 27, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Hugh Unsworth, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the drawings hereunto annexed, and the following explanation thereof (that is to say):—

My improvements in machinery or apparatus for mangling, drying, damping, and finishing woven goods or fabrics, consist, firstly, in a certain combination or arrangement of mechanism or apparatus whereby all such processes of mangling, drying, damping, and finishing employed in bleaching goods, or other operations, may be performed in one machine, instead of being separately effected by distinct machines or processes, as hitherto done, and thus producing a much better finish or condition upon the calicoes or other fabrics, and also greatly economizing hand-labour.

Secondly, in passing the cloth, after it has been once dried, again partially through the mangling or calendering portion of the apparatus, and in contact with the wet cloth, in order that the dry cloth may thus be damped or conditioned, which necessary process in finishing woven goods or fabrics is usually performed separately by a damping-machine.

And lastly, in the application of a drying cylinder to the ordinary mangling or calendering apparatus, thereby rendering that machine much more effective in its operation upon the cloth in those instances where my improved combination or arrangement of machinery is employed in mangling only, and not for the finishing process. But in order that these improvements may be perfectly understood, I have attached to these presents two sheets of drawings, exhibiting several views of my improved apparatus, and drawn of about the scale of one inch to the foot, and have marked the same with figures and letters of reference, having placed similar letters upon corresponding parts of the machinery in all the figures.

Description of the Drawings.

In sheet 1, fig. 1, represents a side elevation of my improved apparatus, and represented as adapted to operate upon calicoes, &c., subsequent to the process of bleaching.

In sheet 2, fig. 2, represents a similar view in section, taken vertically through about the middle of the machine; and,

Fig. 3, is a front or end elevation of the same. The main framing or standard of the machine, *a*, *a*, *b*, *b*, support or carry ordinary mangling or calendering bowls or rollers, *c*, *c*, *c*, *c* (composed, as usual, of brass or metal, and others of paper or cotton, as required), bearing in steps or pedestals, *d*, *d*, *d*, *d*; and also a large drying cylinder, *e*, *e*, heated by steam through its axis supplied by the pipe, *f*, or otherwise. Other auxiliary drying cylinders, *g*, *g*, *g*, *g*, are also provided and suitably fur-

nished with tension or guide-rollers, *h, h, h, h,* when the drying surface of the cylinder, *e,* is not found sufficient in the mangling process only. The machine is also provided with heavy weighted leverage, *i, i,* and connecting links, *k, k,* for the purpose of increasing the pressure of the mangling cylinders, *e, e,* and dispelling the greater portion of wetness in the first instance, as the cloth enters the machine, passing over the stretching or distending bars, *l, l, l, l.* There is also the ordinary similarly weighted leverage, *m, m,* applied to the upper calendering rollers, *c, c,* and also the usual lifting-bar, *n, n,* with its rack and pinion, *o, o,* to be worked by a winch handle for raising the two upper rollers, *c, c,* when necessary, by means of links or rods, *p, p.*

The improved mechanical arrangements and combination of the apparatus being now understood, I will proceed to describe their operation. The wet cloth as it comes from the squeezers, after bleaching or any other wet process, is placed upon a scray or table, and first guided by the hands of the attendant over and under the stretching-rails, *l, l, l, l,* and passed between the two mangling-rollers, *c, c,* where great pressure being applied, as before stated, it is ready to proceed immediately around the drying cylinder, *e, e,* when it may be only partially dried, and passing onwards (in the direction of the arrow) is submitted to the upper calendering cylinders, *c, c,* and over the other drying cylinders, *g, g, g, g,* as indicated by the red line in the drawing, when the dried cloth is again passed into the machine at the back proceeding from the surface of the lowest drying cylinder, *g,* as indicated by the blue line, which represents the same piece of cloth going through the calendering-bowls, *c, c,* a second time, and in contact with the wet or only partially dried cloth, and thus receiving the operation of damping by such contact only, instead of being separately damped by another machine, as heretofore done, this damping or finishing operation being thus much better performed, and the con-

dition and finish of the cloth materially improved, when it is wound upon a roll at *q*, by a strap, *r*, passing around the pulleys, *s*, *s*, or any other convenient manner.

Lastly, I would remark, that an ordinary stretching cylinder may also be employed in this machinery in place of the rails, *l*, *l*, as shewn by dots in fig. 2, and that I have not represented the whole of the gearing for driving the machinery, as that will be well understood to depend entirely upon the particular situation of the machinery, and its araangement with reference to the moving power. —In witness whereof, &c.

Enrolled February 27, 1841.

Specification of the Patent granted to JUNIUS SMITH, *of Fen Court, Fenchurch Street, in the City of London, Gentleman, for Improvements in the Means of Economizing Heat and Saving Fuel.*—Sealed November 25, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Junius Smith, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

These improvements consist in a mode of supplying heated atmospheric air to furnaces of every description, by a new form of revolving blower mounted in a double blower-case, which blower draws in the fresh air through openings in the centres of the blower-boxes, and forces the same by compression into the ash-pit, which is closed air tight, the fresh air being commingled with and heated

by the heat which would otherwise escape with the unconsumed combustible gases produced by the combustion of the fuel, which heat and gases are not allowed to escape by the chimney or flue in the ordinary way, but instead thereof are retained in a receptacle between the usual point of escape and the top or back of the blower-box, and being received thence by the blower, are returned into the fire through the closed ash-pit, the combustion of the fuel and of these returned gases being maintained by the fresh air supplied through the centres of the blower-boxes. The heavy and incombustible gases are allowed to descend by their own gravity into a receptacle in the outer box beneath the blower, where the general compression operates in aid of the gravity, to force them through the interstices of a bed of sand, gravel, small pebbles, or any compound of similar substances that will offer and maintain a resistance to the internal pressure, and yet allow these gases to escape by filtration into a chamber, whence they are taken away by a pipe or channel in any convenient direction. The form of blower intended to be generally used in these operations is equally and advantageously available for furnaces of any description, whether working so that the gases evolved by combustion escape into the atmosphere or not, and is hereinafter described accordingly. By these combined operations the smoke and combustible gases are all or nearly all consumed; no smoke or sparks are given off, no heat escapes, no chimney is needed to produce the draft required; combustion and a considerable saving of fuel is effected, as the heat and combustible gases which are lost in and through the common chimney are all used within the furnace and flues, and a complete protection is afforded against fire.

Description of the Drawing.

The mode of constructing and using the apparatus for producing these effects is now to be described, re-

ference being had to the drawings attached to and making part of this specification, wherein

Fig. 1, is a plan.

Fig. 2, a vertical section of a common upright furnace, with this apparatus attached for use.

Fig. 3, is a plan; and,

Fig. 4, is a vertical section of a mode for fitting the apparatus to the furnace of a locomotive boiler, of which only the lower part of the fire-chamber is shewn.

Fig. 5, is an end elevation; and,

Fig. 6, a sectional elevation lengthwise of a steam-boat or stationary boiler, with the apparatus attached; but it is not intended by these representations to limit or confine the mode or place for attaching the apparatus, as these must be varied according to the local circumstances of any particular boiler intended to be fitted therewith. The detached figures are hereinafter separately and consecutively referred to and explained, and each letter of reference used applies to the same parts in all the several figures. A, is a common vertical furnace or a boiler. B, is the fire-chamber. *a*, the fire-bars. *c*, the ash-pit, which is to be fitted and enclosed in all cases air-tight, with doors, *b*. The fire-doors, *c*, are made with an outer flat surface, shutting tight and close on a projecting flanch all round the opening, and the inner part or additional thickness of the door which goes within the opening is made less than the opening, so as to leave a small channel all round the opening for purposes hereafter explained. *d*, *d*, are the fire-flues or tubes through the boiler. D, is the connection from the fire-flues to the outer chamber of the blower, E, which encloses the interior or blower-chamber, *e*. *f*, are the bearings for the blower-shaft, *g*; and *h*, is the blower made with arms, h^1, firmed together to carry common straight fans, or fans set as in fig. 2, to force the air and gases through straight and parallel canals, or with fans set at a tangent to the centre air-opening, or with curved fans. These two last forms are

shewn in the figure 4, and the detached fig. 10, but any other form of fan may be used that will answer the intended purpose, or a cylinder and piston-blower, or any other blowing apparatus may be used; but the form of blower herein described will generally be found preferable. In any form of rotary fans the ends of the fans are to be enclosed by the metal disc or plate-rings, *i*, *i*, to prevent any lateral escape, and thereby more effectually impel and compress the current of commingled heated air and returning gases, which are prevented from escaping out of the exterior case or chamber, E, by collar-tubes, *k*. These are open to the atmosphere, and project from the inner edges of the disc-plates, *i*, and their outer ends run air tight in corresponding turned rings in the openings in the chamber, E. These collar tubes are shewn on one side only in figs. 1 and 2, and on both sides in figs. 3 and 4. The heat and gases produced by combustion of the fuel are to be admitted into the blower by an opening in the blower-box, *e*, in any convenient manner. Three modes of doing this are shewn in the drawings, the first, in the detached fig. 7, is applicable for use with all common fan-blowers, and represents a circular slot, *l*, in the side of the blower-box, *e*; when used must be as near as possible at the point where the amount of pressure within the fans will be the same as the pressure of the heat and gases within the outer chamber, E, and the quantity of the gases admitted is to be regulated by a sliding valve-cover over the opening, *l*, moved by a handle going through the outer box, E.

The second mode of admitting and regulating the quantity of the entering gases is shewn in the detached fig. 9. In this the collar, *k*, is fixed in a neck on the exterior box, and does not revolve with the blower, as in the other modes described, and has in part an opening, *x*, between the inner and outer boxes; this is to be more or less closed by a bent plate, *y*, forming a circular slide or valve to regulate the quantity of the gases admitted.

The third mode is shewn in fig. 3, when a small stationary collar, k^1, is shewn on one side, as made conical, the smallest end inwards within the running collar, *k*, leaving a space, *m*, between the collar-tube, *k*, and the inner edge of the disc or plate ring, *i*, which will allow the entrance of the gases into the blower at the part where they will be forced in by the general internal pressure in the chamber, E, the other collars may either be made to run the same, or be made tight as represented. The passage way, *n*, from the blower into the closed ash-pit, is shewn in fig. 2, as opening direct; and in figs. 3 and 4, as entering by a flat horizontal funnel or tube, n^1, extending to the farther end of the ash-pit, and terminating in an opening, n^2, on each side of the tube, n^1. In figs. 5 and 6, the passage way from the blower to the ash pit, is shewn as a descending flue. In fig. 4, the rib, O, round the ash-pit, C, supports a plate, P, between the fire-bars and the entering blast of hot air and gas; this plate, P, is perforated full of small holes, and receiving the first pressure of the blast, disseminates it equally against and through the under part of the fire. In the bottom of the exterior box, E, is a box, *v*, shewn separately, in fig. 8. The top and bottom of which are formed by a wire or metal grating, and the space within is filled with small pebbles, fine gravel, coarse sand, or pummice-stone, pounded, or any similar compound that will in quantity or texture, or both, offer a partial resistence to the internal general and equal pressure created by the action of the blower. The uncombustible gasses generated from burning fuel being specifically heavier than those which are combustible, will by their own gravity separate from the others; and in the first instance lodge on the bed of sand or gravel, when the compression created by the blower will operate in aid of their increased gravity, to force such gases through the sand or gravel into the space beneath, whence they may be conveyed away in any convenient manner, as by the escape pipe, *u*, shewn in fig. 2,

or by the pipe, *u*, figs. 5 and 6. In these last figures, the bed of sand or gravel, *v*, is shewn, as under the exterior case, E, and the pressure and filtration from within, is upwards, through the gravel or sand, into the escape, *u*, as shewn in the detached fig. 11, but the gravel may be placed below the blower box, *e*, and the hot gases carried behind and beneath the gravel, so that the lighter gases shall filter upwards into the inner box, *e*, leaving the heavier and uncombustible gases to go off through a second filtering bed, v^1, as shewn in section in the detached fig. 12. In fig. 5, the fire-doors, *c*, are shewn, as of two thicknesses, as before noticed, the outer thickness fitting tight in a projecting flanch, the inner thickness does not quite fill the aperture, but closes against an inner frame, and leaves a channel all round the outer part. Into this are two or more small pipes, z^1, from the descending flue, *n*, and from this a small pipe, z^2, leads down, and turns into the ash-pit. This construction allows a portion of the heated air and gases to pass by the compression through the doors, and into the fire, which produces the effect of keeping the inner part of the doors cool by abstracting the heat. This mode of construction is shewn in fig. 14. The exterior case, E, is not shewn in the drawing, as surrounded with a water-jacket, but it is intended to fit such an addition to the apparatus, both for general safety and to form a heater, from which the boiler may be supplied. In some situations, the whole apparatus may be so arranged as to be contained entirely within the boiler, and thus save heat and fuel, prevent all such sparks and dust, and be an entire protection against fire.

The general intent of these improvements as thus far described is, to retain the heat within the fire-flues under compression, and thus obtain a more perfect and equal distribution of the heat and ignition of the fuel, and to return the heat and gases into the fire through the closed ash-pit, commingled with a fresh supply of atmospheric air, instead of the heat and gases being allowed to escape

in the ordinary mode through the chimney; it is, however, not intended to limit the mode of using the apparatus to returning the heat and gases into the fire, as the apparatus may be so constructed as to allow of these escaping through the following bed, or the escape may be by a pipe with a diminished opening, going off by any convenient channel; but in practice, these modes will not be found so advantageous as returning the combustible gases through the blower, the operation of the blower remaining the same in producing an equal pressure within the fire way and flues, and by that a more perfect ignition of the fuel, as in either of these two last modes a considerable portion of the heat passing through the outer box, E, surrounding the blower, will be communicated by the metal to the fresh air passing in, which will thus be supplied to the fire in a state producing the same effect as any other hot blast. Above the perforated plate, *h*, fig. 4, is an apparatus for raking the fire-bars, formed by two cross shafts, *q*, carrying each two small cranks, *r*. These support a small frame, *s*, fitted with vertical teeth, *t*, *t*, so spaced as to pass upwards between the grate-bars, *a*, and rake the fuel up by an alternating motion given by a crank or any other competent means applied to one end of the cross shafts, *q*, outside the furnace.

In cases where a fuel feeder is required, it is intended to place a slide-box where the fire-doors are now usually placed, as shewn in fig. 13, where, a^1, is the slide-box, open at the inner end, and having a cover, a^2, opening upwards against the boiler by hinges. This box encloses a tray, a^3, made to fit close to the box, a^1; at the furnace end, a handle, a^4, passes through the outer end of the box, a^1. The cover, a^2, being opened, the box is to be pushed in and turned, so as to empty the fuel over the fire as required. When a feeder is not used, it will be needful to interrupt the blast when the fuel is put in; and the figs. 1 and 2, shew a mode of doing this safely. *w*, is a valve in the passage from the blower chamber to the ash-pit.

In the outer end of the rod carrying this valve, is a small crank, w^1, shewn by dotted lines, connected to a vertical rod, w^2. In the connecting pipe, D, is a second valve, w^8, connected by a crank, w^9, shewn also by dotted lines, to the rod, w^2. A hanging link, w^3, connects the rod, w^2, to the cross lever, w^4. At the other end of this is a descending rod, w^5, fitted with a shoulder to take the spring catch, w^6, which is operated on by the fire-door latch, w^7. When the fire-door is to be opened, the catch, w^6, will be disengaged, the rod, w^2, will descend by its own weight, and close the lower valve, w, at the same time dropping the valve, w^8. This closes the pipe, D, and opens the escape pipe above, giving vent to the smoke and gas, and interrupting the operation of the blower. When the fire is fed and the door is shut, the fireman draws down the rod, w^5, and hitches it to the latch, w^7. This opens the lower valve, w^4, and rises the upper valve, w^8, which opens the pipe, D, and closes the escape pipe above; this retains the smoke and gas, and the operation of the blower recommences.

Fig. 15, is a plan; and,

Fig. 16, a side sectional elevation, representing the mode of constructing the rotary-blower, for use in open furnaces, without the exterior case, E, the other references all remaining the same, as in the preceding description, except that at 1, the joint between the collars, *k*, and the ring on the sides, may be covered by a metal flanch, if the blower is used with a hot blast, or by a leather flanch ring, if used to drive a common cold blast; either of these will be useful to keep the joint air-tight. This mode is applicable to any kind of open furnace, and will give an equal continuous blast of considerable pressure, which may be varied by changing the speed at which the blower is driven, and will be in proportion to the size of the blower employed. In figs. 5 and 6, b^1, is a damper in the descending flue, *n*. b^2, is a damper in the connecting pipe, D b^3, is a drum, for driving the blower by a bolt

from the engine. b^4, is a damper, to shut the common chimney, when the apparatus is attached to a boiler already so fitted, this shuts off the common escape, and fits the boiler for receiving the apparatus. It is not intended by anything herein contained, to limit the particular form or arrangement of any or all of the respective parts herein described, but to vary these according to circumstances, in any way substantially the same, by which the whole or any part will be best adapted to the purpose intended, as herein set forth.

What it is intended to claim as new is as follows:—

First, the mode of constructing revolving blowers for any purpose, with the ring plates or discs, *i*, *i*, forming enclosures to prevent lateral escape of the air, as shewn in figs. 15 and 16, and the combinations of such discs with fans, formed either as radiating from the centre in the common way, or with straight rectangular fans, such fans forming parallel canals for the passage of the air, as shewn in figs. 2 and 16; or with curved fans, as shewn in fig. 4; or tangential fans, as shewn in figs. 10 and 12. These two last modes, forming canals larger at the periphery, where the air is forced outwards, than where it enters the blower, substantially as such constructions and combinations are described.

Second, the mode of admitting the atmosphere into the centre of the blower, and preventing the escape of the air, from the air-chamber, *e*, by the collars, *k*, *k*, as shewn in figs. 15 and 16; whether the collars are fixtures to the blower-case, or made to revolve with the blower, having the outer ends to run into rings in the case of the blower, or with the two modes combined as described, and the combination of such mode of admitting and preventing the escape of the air, with the enclosed fans described in the first claim, whether the blower be used with a hot or cold blast, substantially as the same are represented and described herein.

Third, the mode herein described, of supplying hot air

to any furnace, by surrounding the inner case of the blower, with an exterior chamber, E, into which the hot and unconsumed gaseous products of combustion from the fuel, are to be received through the fire flues, to heat the air passing through the blower, *e*, and combining with such outer chamber, E, an ash-pit tightly closed, through which the hot air blast is to be forced into, and through the fire and flue-ways; when such hot air blast is used with an open chimney, or with any common escape for the smoke and gas, beyond the chamber, E, substantially as the same are herein described.

Fourth, the mode herein described, of obtaining compression within the fire and flue-ways, and thereby creating a more effective ignition and action of the fuel and combustible gases within the flues, by interposing a bed of sand, gravel, pebbles, or any proper compound, which will offer a partial resistance to, and filter the compressed and escaping gases; such bed being between the fire and the common chimney, or final escape of the gases, and such bed of any proper compound being used in combination with a blower, working within an exterior heated chamber, and forcing the fresh and heated air into a closed ash-pit, and into and through the fire and flue-ways, substantially as such mode and combination is herein described.

Fifth, the mode herein described, of separating the heavy incombustible gases by the direct gravity, and the compression created by the blower in the flue-ways and chamber; E, acting downwards within the exterior chamber, E, of the blower, *e*, shewn in the figs. 1, 2, 3, and 4, substantially as the same is represented and described.

Sixth, the mode herein described, of separating the heavy and incombustible gaseous products of combustion, from the lighter and combustible gases, by the change of temperature, and their own gravity, and causing these heavy gases to accumulate in the lower part of the chamber, E, whence the compression created by the blower,

forces them to filtrate upwards, and escape through the filtering bed, as shewn in the figs. 5, 6, and 11, substantially as the same are represented and described.

Seventh, the several modes herein described, of separating the heavy incombustible products of combustion, from the lighter and combustible gases; or any mode of obtaining compression, separation, and filtration of the gases, by the interposition of porous substances, which shall be substantially the same as any of the foregoing modes, in the means employed, or the effects produced.

Eighth, the modes described of admitting any portion of the hot and combustible gaseous products of combustion from the outer chamber, E, into the inner blower-case, *e*, at any point in the inner-case, *e*, where the hot gas will be forced into the blower-box, *e*, by the general compression created by the blower within the chamber, E, such hot gas being commingled with the fresh air in the blower, and forced into the fire, substantially as herein described; or any mode of admitting the hot and unconsumed combustible gaseous products of combustion, into the blower-case, *e*, and commingling the same with the fresh air entering by the blower, to support combustion, which shall be substantially the same as herein set forth, in the means employed or the ends produced.

Ninth, the combination of a closed ash-pit, with the blower, and with all or any of the before described means, of obtaining compression, separation, and filtration of the gases evolved by combustion of the fuel, by the bed of sand or porous substances, or any compound that will produce the required effect; and the combination of these with the means described and claimed, for forcing any portion of the unconsumed combustible gases into the blower, and commingling the same with the fresh and heated air forced in by the blower, to support the combustion of the fuel, substantially as such combinations are herein described and set forth.

Tenth, the mode of introducing the blast into the

closed ash-pit, by the tube, n^1, combined with the perforated plate, p, to spread and distribute the blast equally under and through the fire, and the combination of these parts with the parts before described and claimed, substantially as the same are herein described.

Eleventh, the mode described of raking the fire-bars by an alternating motion given to the shafts, q, cranks, r, frame, s, and teeth, t, t, as shewn in fig. 4; and the combination thereof, with the other parts herein set forth, substantially as such mode and combination is herein described.

Twelfth, the mode described of feeding the fire with fuel, by the slide-box, a^1, cover, a^2, fuel tray, a^3, and handle, a^4, shewn in fig. 13, and the combination thereof, with the other parts, substantially as such mode and combination are herein described.

Thirteenth, the mode of constructing and fitting the fire-doors and frames tight, with an internal channel between the inner thickness of the doors and the frames, and a pipe or pipes, z^1, entering from the blast-pipe, n, and a pipe or pipes, z^2, passing from the lower part of the doors and frames into the closed ash-pit, as shewn in figs. 5 and 14, to keep the doors cool by the circulation of the blast abstracting the heat from the inner thickness of the doors; and the combination of these parts, with all or any of the other parts hereinbefore described, substantially as such mode of construction and combination is herein set forth.

Fourteenth, the surrounding the outer chamber, E, of the blower-case with a water-jacket, and applying such water-jacket to serve as a heater of water for the boiler, in combination with the other parts herein described.

Fifteenth, the mode of interrupting the blast to feed the fire at the doors, when a fuel feeder is not used, by the valves, w and w^8, cranks, w^1 and w^9, rods, w^2 and w^5, link, w^3, cross-lever, w^4, spring-catch, w^6, and latch, w^7, as shewn in fig. 2; and the combination of these parts

with the other parts, substantially as such mode and combination is herein described and set forth.

Sixteenth, the construction, arrangement, and combination of each and all of the parts herein described, with each other, where such construction, arrangement, and combination, or all or any thereof, are applied to the purposes of economizing heat and saving fuel, substantially as the same are herein described.—In witness whereof, &c.

Enrolled May 25, 1841.

Specification of the Patent granted to HENRY HIND EDWARDS, *of Nottingham Terrace, New Road, in the County of Middlesex, Engineer, for Improvements in Evaporation.*—Sealed November 5, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Henry Hind Edwards, do hereby declare the nature of the said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is say) :—

The invention relates to certain modes of improving the application of heat so as to obtain greater results from a given quantity of fuel; and in order that the invention may be fully understood, I will first point out the principle of action, and then explain the invention, which consists of the application of such principles by practical means, in the evaporation of fluids. It will be found that a liquid, when heated up to its boiling temperature under the pressure of the atmosphere, steam will be emitted: if this steam is taken and forced into a worm or other ap-

paratus contained in the heated liquid from which the steam was generated, and if this steam is compressed until it acquires a pressure of about one-twelfth of an atmosphere greater than its pressure when occupying the space in the evaporating vessel, between the cover and the surface of the heated liquid, the steam forced into the worm will, under such circumstances, be entirely condensed, by giving up its latent heat to the surrounding heated liquid, and that at the rate of about 3 lbs. of condensed steam per hour for every square foot of the heating surface of the worm. The steam produced by the evaporation of the heated liquid will thus by its condensation restore to the heated liquid all the caloric abstracted from it as latent heat, by the steam generated; and the evaporation of the heated liquid may be thus continued, with the assistance only of the power requisite to compress the steam in the worm or other proper refrigerating apparatus, and the restitution of that quantity of caloric which may have escaped from the apparatus by leakage or radiation.

The above result may be obtained by various means and apparatus depending on the fluids to be treated. And in order that a workman may apply the invention to his particular purpose, I will now give such practical directions as will enable him not only to understand the invention generally, but be able to vary the apparatus herein described, in order to render it suitable for the particular vessels to which he is desirous of applying the invention.

Suppose an evaporating pan with an internal worm, a series of pipes offering a sufficient heating surface, and closed by a cover, the edge of which dips into a surrounding trough, containing water or other liquid or fusible substance, or by any other simple joint, it being easily made in consequence of the absence of internal pressure, which is determined by a light valve on the cover, so regulated that it will open as soon as the internal pressure

becomes greater than that of the external atmosphere. An evaporating pan, as above, being prepared, I apply a pump, for the purpose of drawing off the steam as fast as it is generated, from the surface of the heated liquid in the pan, and to force the same into the worm or other apparatus contained in the liquid, this worm having at its lower extremity a valve to regulate the escape of the condensed steam, and loaded so as to determine an internal pressure of from one-twelfth to one-sixth of an atmosphere. I would here remark, that the theoretical working of such an apparatus would be such, that, supposing the liquid in the pan to be heated so as to produce an active ebullition, and the pump kept in motion, ebullition would continue by the mere action of the pump and without any additional heat, if it were posible to prevent loss of heat by radiation and leakage; but as heat will escape, all that can be done will be to protect the surfaces by non-conducting materials, and it will be evident that great advantage will result in evaporating fluids. The condensed steam that will escape from the valve at the bottom of the worm, will serve, by means of another worm in a separate vessel, to heat the liquid to be evaporated, previous to its introduction to the evaporating pan. An evaporating apparatus, may be composed of an upright cylinder containing hollow lozenge-shaped chambers, placed one above the other; this form is very convenient for the purpose of distilling sea-water, in which case, the pump may be worked by hand or otherwise. In the event of the liquid to be evaporated, leaving a deposit, the pan described by the annexed drawing may be used; this pan is shallow, and the heating surface is obtained by a row of pipes, connected to the steam pipe by a revolving joint, so that the row of pipes may be raised by one end out of the pan for the facility of cleaning the heating surface, and for removing the deposit from the bottom of the pan. When the object of evaporation is the precipitation of solid bodies, the worm or other internal heating surface may be attached to the

cover of the pan, and kept a certain distance from the bottom of the pan, so that the precipitated substance (salt for example) may accumulate below without inconvenience. Independent of the mechanical medium of the pump or other convenient blowing machine, as above explained, to determine the action of the steam obtained from the heated liquid in the pan; there is another method which I will describe, and which consists in using steam of an elastic pressure of from three to five atmospheres, in place of blowing machinery; a plan and an elevation in section of apparatus for this purpose, is shewn in figs. 1 and 2, of the annexed drawing, under the denomination of blast-box, by which the effect is produced by the mechanical agency of a blast of strong steam, and in the following manner: a blast of strong steam thrown into a tube of greater area than the blast itself possesses, the two valuable properties of producing at one end of the tube a partial vacuum, and a corresponding pressure at the other end thereof. If then the vacuum end of the tube is put in communication with the pan, above the surface of the heated liquid, the other end of the tube being at the same time connected with, and producing, a pressure in the worm contained in the heated liquid; the blast of steam will produce a similar effect to that produced by a pump, as above explained. The diameter of the blast being to the diameter of the tube into which it rushes, as one is to five, a partial vacuum is obtained behind the blast, and a pressure in front of it, equal to a column of mercury of an altitude of about eight inches, and this power will absorb or carry with it into the tube a quantity of free vapour, equal to about four times its own volume; so that for one volume of steam produced by the blast itself, five volumes of vapour will be injected into the worm or refrigerating apparatus contained in the heated liquid; a certain proportion of the steam employed to produce the blast, will pass through the worm without being condensed, and will escape with the condensed steam

through the pressure valve, placed at the lower extremity of the worm, from whence it can be conveyed through the liquid to be evaporated, of which it will heat up to the boiling point, about six times its own weight. It is obvious that by varying the proportion above mentioned, between the area of the blast of high steam, and the area of the tube through which it rushes, a greater or less pressure will be obtained, and consequently the carrying off of free vapour will be varied.—In witness whereof, &c.

Enrolled May 5, 1841.

Specification of the Patent granted to BRYAN J'ANSON BROMWICH, *of Clifton-on-Teme, in the County of Worcester, Gentleman, for Improvements in Stirrup-Irons.*—Sealed May 13, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—*Now know ye,* that in compliance with the said proviso, I, the said Bryan J'Anson Bromwich, do hereby declare that the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

Description of the Drawing.

Fig. 1, represents a stirrup-iron, constructed according to my invention.

Fig. 2, is an edge view thereof.

Fig. 3, is the frame or upper part shewn separately.

Fig. 4, shews the lower part of the stirrup-iron, whereon the foot rests.

Fig. 5, shews a section of fig. 4.

Fig. 6, shews the rollers employed by me separately; and,

Fig. 7, shews the eye for the stirrup-strap separately, it being attached to the stirrup-iron, by a swivel-joint; or it may be permanently affixed to the upper part of the stirrup-iron.

In the construction of the stirrup shewn in the drawing, there will be found two peculiarities:

First, the using of a series of rollers on the frame or upper part of the stirrup-iron;

And secondly, a mode of applying a surface of leather or other substance for the tread of the foot; and for this purpose, the lower part of the stirrup is formed into a frame to receive such leather or other similar substance, in place of the foot resting on the iron framing, constituting the lower part of the stirrup-iron.

It should be stated, that the same letters are used to indicate the same parts wherever they occur. *a*, *a*, being a series of rollers which turn freely on the frame or upper part, *b*, of the stirrup-iron.

The object of such rollers being to enable the foot coming out of the stirrup more readily, in the case of the rider falling off his horse, and dragging in the stirrup. *c*, is the eye for the stirrup-strap. *d*, is the lower part of the frame of the stirrup, which is made suitably for receiving the bottom of leather, *e*, which is fastened therein, by means of the screws, *f*. The drawing clearly shews the nature of each of the parts separately, and also combined into a stirrup-iron, by which a workman will readily be able to construct my invention; and I would have it understood, that what I claim, is,

First, the mode of constructing stirrup-irons, by the application of the rollers, *a*, *a*.

And secondly, I claim the mode of applying the surface, *e*, for the foot of the rider to rest on, as herein described.

And I also claim the privilege of placing the rollers in contact with each other, or of fixing a piece of metal between them that will not revolve on the frame.—In witness whereof, &c.

Enrolled November 13, 1840.

Specification of a Patent granted to HENRY HOLLAND, *of Darwin Street, Birmingham, in the County of Warwick, Umbrella Furniture Maker, for Improvements in the Manufacture of Umbrellas and Parasols.* —Sealed May 7, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Henry Holland, do hereby declare that the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention relates; first, to improvements in the ribs and stretchers of umbrellas and parasols, by forming them of tubes of steel or other elastic metal, by which strength with lightness is obtained; and,

Secondly; my invention relates to a mode of constructing and fastening the "joints" or "bits," which connect the ribs to the stretchers of umbrellas and parasols.

In order to give the best information I am possessed of, I will proceed to describe the means practised me. I produce tubes from sheet-steel, which metal I prefer, because when hardened and tempered, they retain their figure better than any other metal, in the same manner as is ordinarily practised for making tubes of steel or of cop-

per, and as is well understood, and forms no part of my invention: the two edges which come together do not require to be soldered or otherwise joined; and having obtained such tubes of the size or diameter desired, I cut them into such lengths as are required for ribs and for stretchers, and at the places at the ends of the ribs, where the top tips have to be fastened, I make an indent in each of the tubes, and such is the case where the "bit" or "joint" for receiving the stretcher, the object of which will be better understood hereafter. The tubes of steel for ribs and for stretchers are to be hardened and tempered, as is well understood by persons engaged in working steel, and I prefer the degree of temper should be like that given to saws, and into each end of those tubes which are to be formed into stretchers, I insert small tips or pieces of brass, or steel, or other suitable metal, by soldering or other convenient means, through which tips or pieces the holes for the rivets for attaching the stretchers to the bits or joints on the ribs, and for the wire to fasten them to the runners, as is well understood.

Description of the Drawing.

Fig. 1, represents the rib of an umbrella or parasol made of a steel tube, having part of a stretcher attached thereto.

Fig. 2, shews two sides of a joint or bit, for attaching a rib to a stretcher.

Fig. 3, shews part of a stretcher, and a bit combined. *a, a,* is a rib having the top and bottom tips affixed. The top tip, *b,* which is of the ordinary construction, slides on to the upper end of the rib, *a,* and is affixed by indenting the metal of the top tip, and sinking it into the recess formed in the rib, *a,* which is clearly shewn in the drawing. The bottom tip, *c,* slides on to the lower end of the rib, and is held secure by the thread which fastens the covering to the bottom tip, though I find it desirable to put into the bottom tip some melted glue or other

cement, slightly to hold the bottom tip till the cover of silk or other material is applied. *d*, is the "joint" or "bit" affixed on the rib, *a*, by which the stretcher, *e*, is attached thereto by a pin joint, as is well understood. This "joint" or "bit," I prefer to be made of brass, though other suitable metal may be used, and the peculiarity of this joint or bit is, that it has a hole through it, which allows of its being slided along the rib, *a*, and when in its proper place to be affixed or secured thereto, by simply indenting the metal, and causing it to enter the recess or indent, *f*, formed in the rib, *a*, as before mentioned.

And I would here remark that this description of "joint" or "bit," is equally applicable to umbrellas and parasols, when solid steel or other metal rods or ribs are used, as such bits or joints offer a simple and convenient means of being secured to the ribs by sliding thereon, and indenting the metal thereof, as above described, and clearly shewn in the drawing, such indenting and fixing being readily performed by a sharp blow.

Having thus described the nature of my invention, and the manner of applying "top tips," "bottom tips," and "bits" or "joints," to ribs and stretchers for umbrellas and parasols made of tubes as practised by me, and which I have found fully to answer; I do not confine myself thereto, as other means may be resorted to for making or affixing such parts, without departing from my invention, so long as steel or other metal tubes are employed in the making of the ribs, or the making of the stretchers for umbrellas and parasols.

And I would have it understood, that what I claim as my invention is; first, the mode of making ribs and stretchers for umbrellas and parasols, by forming them of steel or other metal tubes, as herein described; and,

Secondly, I claim the mode of making and fixing of "joints" or "bits" for connecting the ribs and stretchers

of umbrellas and parasols, as herein described.—In witness whereof, &c.

Enrolled November 7, 1840.

Specification of the Patent granted to James Deacon, *of No.* 136, *Saint John Street Road, in the County of Middlesex, Gentleman, for Improvements in the Manufacture of Glass Chimneys for Lamps.*—Sealed November 19, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—*Now know ye*, that in compliance with the said proviso, I, the said James Deacon, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention relates to improvements in the manufacture of glass chimneys for lamps, whereby a projecting ring or partition of glass is formed within each chimney, such partition having a circular opening, A, therein, through which the flame of the lamp passes, and the projecting ring or partition should be so placed, in respect to the lower part of the chimney, that the opening of the partition may, when in use, come to a position above the wick or point of combustion of the lamp, which arrangement will cause the air ascending from below upwards (to support the combustion of the flame) to be prevented ascending parallel with the chimney; on the contrary, the air as it descends, coming in contact with the projecting ring or partition, will be deflected off towards the centre or middle of the chimney, by which means the combustion will be more complete, and the shadow caused by metal

deflectors will be avoided. And in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the drawing hereunto annexed.

Description of the Drawing.

Figs. 1, 2, and 3, shew three cylindrical glass chimneys constructed according to my invention, the only difference in those figures being the inclination of the internal projecting ring or partition.

Fig. 4, shews another glass chimney constructed according to my invention, the upper part of which is formed conical. And I would remark, that my invention does not depend on the external figure of the chimney, but relates to the new mode of constructing glass chimneys with internal projecting rings or partitions of glass.

In each of the figures, *a*, *a*, indicates the glass chimney; and, *b*, *b*, the internal projecting ring or partition of glass; and when a chimney is completed according to my improvements, the whole is composed of one piece of glass.

In making a chimney according to my invention, the workman proceeds as if he were about to blow a cylindrical chimney of glass. Opposite the point, *b*, by means of callipers, he causes the cylinder to be girt in, as is shewn at fig. 5, until the opening, *c*, *d*, through that part which becomes the partition is of the size desired; he then causes the surfaces, *e*, *e*, to be pressed together, when they will become one plate or surface, as described in respect to the partitions, *b*, in figs. 1, 2, 3, and 4; the workman using a maundril, whilst the chimney is yet hot, to press the partitions upwards or downwards, according as he wishes to have the partition, or he lets it remain in a horizontal position, as is shewn at fig. 4. The operation of blowing glass, being well understood, a workman acquainted with such process, will, from the description above given, readily blow

chimneys, and form the protecting rings or partitions, *b*, therein, the chimneys being completed, they are to be carefully annealed, as is well understood.

Having thus described the nature of my invention, and the manner of performing the same, I would remark that I am aware, that it is not new to cause the air which supports the combustion of the flame, to be deflected in a direction towards the centre or middle of the chimney, at a point above the wick, or point of combustion of the lamp; metallic surfaces having been used for such purposes before, and patents having been taken for the means of supplying such metallic surfaces. And I am also aware, that glass chimneys have been made with contracted openings from the lower portions thereof, into the upper portions thereof, as is indicated by fig. 3; but I believe they have not been successful in use. I would therefore have it understood that what I claim as my invention, is the new combination of means, and the new construction of chimneys for lamps, herein described, by projecting rings or partitions of glass, having each an opening through it for the flame to pass, as hereinbefore described.—In witness whereof, &c.

Enrolled May 19, 1841.

Specification of the Patent granted to JOSIAH MARSHALL HEATH, *of Allen Terrace, Kensington, in the County of Middlesex, Gentleman, for certain Improvements in the Manufacture of Iron and Steel.*—Sealed April 5, 1839.

To all to whom these presents shall come, &c., &c.—*Now know ye*, that in compliance with the above proviso, I, the said Josiah Marshall Heath, do declare the nature of my said invention to be,

First, the extraction of pure cast iron, from certain

ores of that metal, without the intervention of any earthy, alkaline, or saline matter, to form a vitrious flux, cinder, or slag.

Secondly, the formation of cast-steel, by fusing the said pure cast-iron along with malleable-iron, or certain metallic oxides, in such proportion as may decarburate the cast-iron to a certain degree, and by completing the decaburation in a suitable cementing furnace.

Thirdly, the use of a certain portion of oxide of manganese in the process of converting cast-iron into malleable-iron by the process of puddling; and,

Fourthly, the use of carburet of manganese in any process whereby iron is converted into cast-steel. And in further compliance with the said proviso, I, the said Josiah Marshall Heath, do declare the manner in which my said inventions are to be performed, by the following general explanation and particular details of the several processes. Malleable iron is at present produced by smelting the richer iron ores with just as much charcoal or other carbonaceous matter as shall be adequate to abstract all the oxygen from the ore, and bring it into the malleable state, or by smelting the ore in contact with carbonaceous matter in such excess as to form with the metal, the compound called carburet of iron by chemists, and cast-iron by manufacturers, and then to separate the carbon by a distinct and subsequent process. The first of these methods is that practised upon the purer native oxides of iron in the Catalan forges of the Pyrenees, in the Stück Ofen of Earinthia, and in the Bloomeries of India; the second is that practised in the blast furnaces of Great Britain upon the argellaceous ores of iron. By the first process malleable or bar-iron of very unequal quality in its different parts is produced, by the second process a cast-iron is obtained, which is contaminated to a very considerable degree with sulphur, phosphorous, arsenic, silicon, aluminum, &c., and by both processes a very large proportion of the metal is roasted into cinders

under the blast, as well as in the operation of puddling and reheating the blooms. A pure native oxide, or carbonate of iron, is alone capable of producing a pure metal convertible into good steel, but such pure ores have been hitherto debased and deteriorated in the smelting by mixture with earthy, saline, or alkaline matters, under the name of fluxes, added with the intention of promoting the reduction of metal, and of protecting it when reduced from the oxidizing influence of the blast. I have discovered, after an extensive course of experiments, that such earthy or other mixtures are not necessary towards the reduction of the pure native oxides and carbonates of iron, and this discovery constitutes my first invention under the present letters patent. This invention consists in smelting such pure ore without the formation of any vitrious flux, slag, or cinder, in manner as follows:—I commence the operation by filling progressively my blast furnace with coke, charcoal, or other equivalent fuel, leaving the tap-hole open, that the flame of the fuel, urged by the blast, may play in all directions downwards as well as upwards, so as to bring the whole interior of the furnace into an uniform state of incandescence, and whenever the furnace is thus filled with ignited fuel, I close the tap-hole, and immediately throw into the mouth of the furnace 20 lbs. of ore for every 100 lbs. of fuel, and I continue to charge the furnace at this rate till such time as it is calculated that 3 or 4 cwt. of fluid iron are collected in the hearths, at which time I tap the furnace and run off the melted metal into pigs. After this first discharge or casting I begin to add the ore at the rate of 25 lbs. for every 100 lbs. of fuel, and continue to charge the furnace at this rate during a period of twelve hours, at which time I tap and run off a second casting of pig iron. After this second discharge I add ore at the rate of 30 lbs. for every 100 lbs. of fuel during the third working period of twelve hours, and thus in each successive period of twelve hours I increase the burthen of ore at the rate of five per

cent. of the weight of the fuel, till eventually the proportion of ore shall amount to about 65 or 70 lbs. for every 100 lbs. of fuel. By proceeding in this way, and by throwing in the ore merely reduced to the size of peas, or thereabouts, but not roasted, I find that if the furnace be well attended to by the workman it will turn out about 50 lbs. of pure pig-iron for every 100 lbs. of fuel that are consumed. I prefer to run the fused metal into iron moulds, because I have found that when it is run into sand, as is commonly practised by the iron smelters, it is apt to get covered with a coat of silicous matter, and is thereby contaminated and subject to waste in the subsequent process of conversion into malleable iron or steel, but I do not claim running the iron into iron moulds as any part of my invention.

Having by the said process obtained a pure cast-metal, or a simple carburet of iron contaminated with the sulphur, phosphorous, silicon, and other metalloids present in ordinary cast-iron, I next proceed to convert that carburet into steel of any degree of hardness, which conversion I perform as follows:—I first melt the said cast-iron in a cupola-furnace by the heat of coke as free from sulphur as possible, or by a mixture of coke and anthracite, or in certain localities by wood-charcoal; but in all cases I use no more fuel than is merely requisite to smelt the iron, so that the oxygen of the blast shall serve to burn away the carbon of the carburet in a considerable degree, while I neutralize or remove a further portion of the carbon by the addition of scraps of metallic iron, or by the oxides of iron or of manganese, always taking care not to decarbonate the metal to such a degree as to render it infusible, but to leave about as much carbon in it as exists in cast-steel. For the purpose of producing a superior article of cast-steel from my said pure cast-iron, obtained by the above described process, I introduce sesqui-oxide of manganese or protoxide, which has been previously ignited, in quantities not exceeding five per cent. into the

cupola, while I employ no more fuel than the blast can readily burn into carbonic acid, for otherwise the excess of the carbonaceous fuel would deoxizide the manganese, nullify its decarburating action upon the cast-iron, and thus preventing it from reducing the metal to that lower stage of carburet which constitutes cast-steel. I also sometimes introduce into the cupola, for the same decarburating purpose, a portion not exceeding five per cent. of chrome ore, which consists of the oxides of chrome and iron, or a like proportion of pure oxide of iron. When the decarburation has been carried on in the cupola to the proper pitch, as has been already defined, the steely metal is to be run out and cast into iron moulds. The ingots thereby formed are now to be converted into steel of any desired degree of mildness, by a further process of decarburation, which consists in stratifying the said ingots alone with peroxide of iron or peroxide of manganese without charcoal, in a steel-cementing or other suitable furnace, such furnace being lined with iron. If it is constructed of fire-bricks or stone, to prevent the action of the peroxides upon the stone or bricks of the furnace, the ingots are to be here subjected to a cementing heat for a certain period, proportionable in duration to the softness required in the metal. I further propose to improve the quality of malleable or bar-iron, by adding to the pig or plate-iron in the puddling-furnace while in fusion, from one to five per cent., or thereabouts, of any pure oxide of manganese, but without mixture of any other substance, the sesquioxide being that which I prefer.

Lastly, I propose to make an improved quality of cast-steel, by introducing into a crucible bars of common blistered steel, broken as usual into fragments or mixtures of cast and malleable iron, or malleable iron and carbonaceous matters, along with from one to three per cent. of their weight of carburet of manganese, and exposing the crucible to the proper heat for melting the materials, which are, when fluid, to be poured into an

ingot mould in the usual manner; but I do not claim the use of any such cast and malleable, or malleable-iron and carbonaceous matter, as any part of my invention, but only the use of carburet of manganese in any process for the conversion of iron into cast-steel. I claim, first, the reduction of the pure native oxides and carbonates of iron into cast-iron, without the intervention of flux, or the production of cinder.

Second, the production of cast steel by decarburating cast-iron to a certain degree in a cupola or other suitable furnace or crucible, with the addition of malleable-iron or certain metallic oxides, and completing the decarburation to the required degree by subsequent cementation in a suitable furnace, with an oxide of manganese, or an oxide of iron, without any admixture of carbonaceous matter.

Third, the employment of oxide of manganese alone in the puddling of cast iron; and,

Fourth, the employment of carburet of manganese in preparing our improved cast steel.—In witness whereof, &c.

Enrolled October 5, 1839.

Specification of the Patent granted to HENRY SCOTT, *of Brownlow Street, Bedford Row, in the County of Middlesex, Surgeon, for Improvements in the Manufacture of Ink or Writing Fluids.*—Sealed December 30, 1840.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Henry Scott, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, (that is to say):—

Take forty-eight pounds of logwood chips, and let them be saturated two days in soft water, and then put the same into a close covered iron cauldron, and add eighty gallons of soft water; let these be boiled one hour and a half, when take out the wood and leave the fluid, to which add forty-eight pounds of the best picked Alleppo galls in coarse powder; boil these half an hour longer, when draw off the fire, and let it remain in the cauldron twenty-four hours, infusing, during which it is to be very frequently agitated; when the properties of the galls are sufficiently extracted, draw off the clear fluid into a vat, and add forty pounds of pulverized sulphate of iron; let these ingredients remain a week (stirring daily), after which time add four gallons of vinegar; next take seven pounds and a half of the best picked gum Arabic, and dissolve it in sufficient water to form a good mucilage, which must be well strained, and then added to the fluid by degrees; let these stand a few days longer, when pour into the same twenty ounces of the concentrated nitrate of iron; let the whole stand by again, until it has arrived to its height of blackness; next pour the clear fluid off from the sediment, and add to it the following substances, each prepared and ground separately.

First, take half a pound of Spanish indigo, which grind very fine between a muller and stone, adding by degrees portions of the ink until it is made into an easy soluble paste; next take well washed and purified Prussian blue five pounds, which prepare as the former, except grinding it in distilled water in lieu of the fluid, until it is formed into a soluble paste; also next take four ounces of gas black, which results from the smoke of gas burners received on surfaces of glass, as is well known, which grind in one ounce of the nitrate of iron; when each is sufficiently fine, let them remain a few hours unmixed, when the whole may be incorporated with the fluid, and kept agitated daily for a week. The clear may then be poured off for use. The above will make eighty gallons.

Having thus described the nature of my invention, and the manner in which the same is to be performed, I would remark, that although I have been particular in describing the materials for making ink, I do not confine myself to the use of all the ingredients, nor to the quantities given, the invention being peculiar, inasmuch as the application of nitrate of iron and gas black, which I generally use, combined in the same ink, though only one of them may be used. And I claim the application of nitrate of iron and gas black, when combined with other suitable materials in the manufacture of ink.—In witness whereof, &c.

Enrolled June 30, 1841.

Specification of the Patent granted to WALTER RICHARDSON, *of Regent Street, in the County of Middlesex, and* GEORGE MOTT BRAITHWAITE, *of Manor Street, Chelsea, Gentlemen, for Improvements in Tinning Metals.*—Sealed September 17, 1840.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, we, the said Walter Richardson and George Mott Braithwaite, do hereby declare the nature of our said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof (that is to say) :—

The invention relates to combining nickel and iron with tin, in order to improve the tinning of metal surfaces : the nickel is to be either in its natural state as taken from the mine or purified, as is well understood—the latter is preferred.

From the mixture of these metals with the tin, as hereinafter described, there results a reciprocity of properties, the iron and the nickel giving to the tin more consistency; and on the other hand, the nickel and the iron from their

mixture with the tin, become more ductile, and, therefore, mutually contribute to produce the effect desired, namely, a tinning more firm, less fusible, more adherent, and producing whiter surfaces than what are produced by the ordinary tinning now practised.

The proportions of nickel and iron mixed with the tin, in order to produce the best tinning, are ten ounces of the best nickel and seven ounces of sheet iron, to ten pounds of tin.

The temperature at which nickel is fusible being higher than that required to bring tin into a state of fusion, it is necessary to prevent the tin, as it melts, from evaporating; and as it is essential, in order to effect the admixture, that these two metals be put into the same crucible; this object is obtained by adding to ten pounds of the composition, about one ounce of Borax, and three ounces of pounded glass; the heat soon forces the borax to bubble up, which augments the volume, and causes it to unite with the melted glass, without at the same time mixing with the metals; the lightness of these two agents in comparison with the metals, causing them to rise to the surface, where they form a crust, which prevents the action of the air on the metals, the fusion of which proceeds under the influence of a concentrated heat.

This crust, therefore, on the one hand prevents the tin from evaporating, through the effect of the high temperature necessary to effect the fusion of the nickel, and on the other hand, impedes the action of the air in the metals in fusion.

The fusion of the three metals is completed, and their perfect admixture effected in the space of about half an hour, when it is then only necessary to make a hole in the crust formed by the borax and the glass, and thus run it off.

With regard to the process of application and the employment of the tin thus composed, it is the same as those used in ordinary tinning, and is applied with the

same facility as other tinning: and a workman accustomed to practise the old mode, will readily perform the process when nickel and iron are used.—In witness whereof, &c.

Enrolled March 17, 1840.

Specification of the Patent granted to William Neale Clay, *of Flimby, in the County of Cumberland, Gentleman, for certain Improvements in the Manufacture of Iron.*—Sealed March 31, 1841.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said William Neale Clay, do hereby declare the nature of my said invention, and the manner in which the seme is to be performed, are fully described and ascertained in and by the following statement thereof (that is to say):—

In manufacturing iron from iron ore, as at present generally practised, the ores are roasted or calcined, smelted in blast-furnaces, refined, and puddled, in order to make malleable-iron. It has, however, been proposed to manufacture wrought or malleable-iron from iron ores without the aid of the blast-furnace, and, amongst others, I did obtain letters patent for a mode of treating rich iron ores by means of a certain process in closed vessels, which I have found fully to answer; and it has also been proposed to manufacture wrought or malleable-iron from iron ores without smelting in blast-furnaces, by submitting them to heat with carbonaceous matters in open or reverberatory furnaces; and I am informed, and believe, that some attempts have been made practically to carry out such propositions, but the same have failed. Now my invention relates to a mode of manufacturing wrought or malleable-iron from iron ores by means of reverberatory furnaces when combined with certain propor-

tions of carbonaceous matters, whereby I am enabled, in a very short space of time, to manufacture wrought or malleable-iron from the rich iron ores, such as are found in Cumberland, Lancashire, and other places, and also from other iron ores, which, having been calcined, contain forty-five per cent. of iron; for it should be remarked, that I do not consider it advantageous to work according to my invention with ores or calcined ironstones having a less per centage of iron; and,

Secondly, my invention relates to combining with such process wherein carbonaceous matters are used in certain proportions, as hereinafter described, the making of malleable-iron from ore, pig-iron, and scrap-iron; but my invention does not relate to any process of combining pig-iron in a puddling or reverberatory furnace with iron ore when the carbonaceous matter employed does not exceed twenty-eight per cent. by weight of the weight of iron ore put into the furnace; and in order to give the best information in my power of the means of performing my invention, I will proceed to explain the process pursued by me, and which I have found fully to answer. I would however first remark, that the invention herein described is the result of a series of experiments, by which I have ascertained that the attempts heretofore made for converting iron ores into malleable-iron by means of carbonaceous matters in reverberatory furnaces have failed, from a want of knowledge of the effects of carbonaceous matters when so employed, from which circumstance the quantities of carbonaceous matters heretofore attempted to be used could have little if any effect in converting iron ore into malleable-iron, and the means heretofore attempted were not such as would practically prevent such small quantities which might be converted from being oxidized by the working of the reverberatory furnace. I wish it therefore to be understood that I do not in this my specification claim to be the first to propose manufacturing malleable-iron from iron ore in reverberatory fur-

naces; but my invention is confined to combining carbonaceous matters in quantities not less than twenty-eight per cent. by weight of the iron ores when worked in reverberatory furnaces; but as the actual quantity will generally exceed twenty-eight per cent., and as the extent beyond that amount wlll vary from a variety of causes, I will hereafter give such information as will readily enable the workman to judge when he is using the proper relative quantity for the iron ore under operation. I take any of the rich ores of iron, or such as may contain forty-five per cent. or upwards of that metal, or any of the earthy stones, carbonates of iron, or other ores, which when calcined or roasted may contain the quantity named, and by means of mill-stones, rollers, or otherwise, break the lumps to such a size as that they may pass through a riddle or screen of thirty-six meshes to the square inch. To 100 parts of such ore or calcined iron-stone, by weight, I add from thirty to forty parts of coal-slack, coke, wood, charcoal, peat, anthracite, or other suitable corbonaceous matter, reduced and riddled to the same size, and after well mixing together I throw the same into a puddling or or balling furnace of the customary construction, and in a state suitable for receiving pig-iron to be puddled. Every five minutes, or thereabouts, the mixture should be moderately stirred up, until at the termination of some time, and dependent in a great degree on the heat of the furnace, it exhibits appearances of becoming metallic, by the hottest parts adhering or welding together, the furnace should then be brought to its greatest heat and the charge balled, taken to the hammer or squeezers, and treated as puddled-iron in the customary mode.

I would now remark, that the definite quantity of coal, or other carbonaceous matter, cannot be named without taking into the account the exact quantity of iron contained in the ore or calcined stone, and the quantity of carbon, carburetted hydrogen, or other decomposing pro-

perty in the coal, anthracite, or other material employed; but, as a general rule, I recommend that where 100 parts of ore or calcined stone may contain fifty of metallic iron, then I would add thirty parts of carbonaceous matter, and for every additional two parts of iron in 100 of the ore I would add one part of the carbonaceous matter; and where it can be cheaply procured I give the preference to bituminous coal for mixing with the ore or calcined iron-stone. In place of an ordinary puddling-furnace I prefer to have the flue from the puddling-furnace carried into a chamber formed over or at the end or side of an ordinary puddling-furnace, so that a charge of the mixture placed in the upper chamber may be getting heated during the time of operating on the charge in the puddling-furnace, and when that charge is drawn, to be removed into the puddling-furnace. I have found, in addition to the advantages derivable from the simple conversion of iron ore into malleable-iron, that there is a further benefit in respect to weight of product to be derived from applying pig-iron or scrap-iron in the puddling-furnace when working iron ore as above explained, and the best time for so applying pig or scrap-iron is when the ore and carbon are well heated, if a single bedded furnace be used; but if a double furnace be employed I then heat the ore and carbonaceous matter in the preparatory bed, and add the pig or scrap-iron when the charge is transferred into the working bed, and I find that an equal weight with the ore may be added with advantage. I do not however confine myself to such quantities or time of applying pig or scrap-iron, so long as the proportion of carbonaceous matter applied is equal to the proportion above stated in respect of the ore. The workman will, after a short experience, with ease soon be able to judge of the requisite quantity of carbonaceous matters required most advantageously to work any particular class of iron ores by paying attention to the following particulars:—First, if in the working of

the first charge of a particular description of ore the return of iron be deficient in yield with reference to the known analysis of the ore, say less than two-thirds to three-fourths of the iron therein, and that a larger proportion of cinder or slag runs from it than might be expected, and if all appearance of carbon or coke vanish at an early stage of the process, then there is a deficiency of carbon, and it must be increased in working subsequent charges.

Secondly, if the return be good, but do not ball up readily, or stand the hammer well, and if large quantities of coke be seen floating on the molten cinder at the close of the operation, then there is too much carbonaceous matter in the mixture, and in future charges it must be reduced.

Thirdly, if the cinder be moderate in quantity, if the iron ball up readily, if the coke disappear about the time of balling up, and the bloom stand the hammer well, then may the proportions be deemed correct.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that what I claim as the invention secured by the present letters patent is, first, the mode of manufacturing wrought or malleable-iron in reverberatory furnaces from iron ore by combining therewith twenty-eight per cent. or upwards of carbonaceous matters, as herein described.

Secondly, I claim the mode of manufacturing wrought or malleable-iron from iron ore in reverberatory furnaces by combining therewith twenty-eight per cent. or upwards of carbonaceous matters, and pig-iron and scrap-iron, as herein described.—In witness whereof, &c.

Enrolled September 30, 1840.

Specification of the Patent granted to WILLIAM FREEMAN, *of Millbank Street, in the County of Middlesex, Stone Merchant, for Improvements in Paving or Covering Roads and other Ways or Surfaces.*—Sealed September 7, 1840.

To all to whom these presents shall come, &c., &c.—*Now know ye*, that in compliance with the said proviso, I, the said William Freeman, do hereby declare that the nature of the said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof (that is to say):—

The invention relates to a mode of paving or covering roads and other ways or surfaces, and also the tops or surfaces of walls, usually paved or covered, by the application of Indian-rubber (caoutchouc) combined into blocks or slabs, with other matters, as hereafter described; and in order that the invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued in carrying out the invention. It is well known to persons acquainted with the manufacture of Indian-rubber into various articles now made, or partly made, therefrom, that such substance is capable of being reduced to a soft and pasty state by grinding; and the process is performed in the following manner: into a strong iron-cylinder, having a strong axis passing through it, with teeth projecting therefrom, the Indian-rubber (cut into small pieces) is put; and by the revolving of the axis with spikes, the Indian-rubber becomes reduced to a strong pasty state; and when in this condition, I gradually grind in a quantity of charred saw-dust, in order to combine the same with the Indian-rubber, the saw-dust being charred by moving on a hot plate, or by using a heated vessel, such as is used in roasting coffee, or by other convenient means, such charring only being carried to a very moderate ex-

tent; and by the process of grinding and mixing, as above explained, until the mass will not take up more of the charred saw-dust; I then take out such compound and put it into iron or other moulds of the size desired, and submit the materials to pressure in a similar manner to what is now pursued for obtaining blocks of Indian-rubber for manufacturing purposes; but in submitting the compound to pressure, I apply a quantity of strong rough sand into the mould to that surface of the block which is to come to the upper or outer surface of the paved road or way, or of the wall covered, or partially covered, by such blocks or slabs, by which means, when the blocks in the mould come in to be pressed, the upper surface thereof will have a quantity of rough sand forced into such upper surfaces; and I permit the blocks or slabs so formed to remain under pressure in the moulds till the materials are cold; I then take them out of the moulds and pile them away for use; but I prefer that the blocks or slabs so made should stand as long as possible, subject to the influence of the atmosphere before using them for paving or other purposes. The sizes of the blocks used may be varied, depending on the extent of traffic on the road or way. For paving a road or way where there is considerable traffic, I consider blocks 12 in. by 12 in. by 3 in. a proper size; and for paving foot-paths, blocks or slabs of one inch in thickness are of a convenient thickness; and for covering walls, I make the blocks about the size of ordinary bricks. And in using such blocks for paving, the road or way is to be brought to a proper surface, as if about to pave with blocks of other materials; and the Indian-rubber blocks are to be applied over such surfaces, and the blocks are caused to adhere one to another by using Indian-rubber cement. Another mode of using such blocks is by covering a surface to be paved with blocks of other materials with such blocks of Indian-rubber, but not to the same depth, and then applying blocks of wood or stone. And I would remark, that al-

though I prefer to use saw-dust in compounding blocks with Indian-rubber, yet the same may be dispensed with, and sand or finely broken stone may be used in preparing the Indian-rubber blocks.

Having thus described the nature of the invention, and the best manner I am acquainted with for performing the same, I would have it understood that I do not lay any claim to grinding Indian-rubber, nor to the pressing it into blocks, Indian-rubber having been submitted to those processes before; nor do I confine myself to the means described for accomplishing those processes; but I believe them to be the best for the purpose; but what I claim is, the mode of paving or covering roads, and other ways or surfaces requiring to be paved or covered, by applying Indian-rubber (caoutchouc) combined with saw-dust, sand, or finely broken stone, and pressed into blocks or slabs, as described.—In witness whereof, &c.

Enrolled March 6, 1841.

Specification of the Patent granted to Felix Troubat, *of Mark Lane, in the City of London, Merchant, for Impromements in the Manufacture of Vinegar.*—Sealed August 1, 1840.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Felix Troubat, do hereby declare, that the nature of the said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following statement thereof, (that is to say):—

This invention consists of a mode of making vinegar by the application of potatoes and rice; and in order that the invention may be fully understood, I will describe those processes that have been found best for carrying

out the invention, although I do not confine myself thereto. I take about 350 lbs. of potatoes in their raw state, and have them well rasped or grated by any of the ordinary means, and then mix them with about 20 to 25 gallons of water, and add about 2 lbs. of sulphuric-acid: the whole is well mixed together, and boiled for about six hours, when it is to be run off into a vessel to cool—this vessel should have at the upper part a perforated plate, in order that, as the liquid runs in, it may be clarified and freed from any sediment or deposit which will be found in it. The mode that I adopt for obtaining the requisite fermentation to this liquid is as follows: I bring it into a vessel placed in a chamber, heated to about 80° of Fahrenheit, and add about half a bushel of yeast and about one ounce of potash previously dissolved in water. The liquor in this state is allowed to stand for three days, when I add another quantity of yeast to advance the fermentation. This is allowed to rest for some time, when it is to be drawn off into another vessel, which is filled loosely with the shavings of beech wood, or the husks or skins of grapes, after they have been pressed, previously prepared by being well saturated with strong vinegar. The quantity of liquor I prefer to put in at a time is about three gallons, which should be repeated every morning and evening until the vessel is full, or nearly so; it may then be drawn off in quantities of three gallons at a time at the bottom of the vessel, by means of a cock, and carried to another vessel half filled with vinegar, which will complete the process.

It is drawn off from the vessel by means of a cock placed about the centre of the vessel, into another vessel, loosely filled with the shavings of beech, in order to cool and clear it, before it is fit for consumption.

In making vinegar from rice, in place of using 350 lbs. of potatoes, I only use about 50 or 60 lbs. of the meal of the rice (which is previously prepared by crushing) to the same quantity of water and sulphuric-acid, and then

I submit it to the same process as previously explained; this is also the case when making it from the potatoes, with their skins previously removed.

Another mode that I employ is as follows: I take 350 lbs. of potatoes, which, after having been well crushed, should be soaked in cold water, and then I add about 50 gallons of boiling water, taking care that the whole should be well stirred up until the liquor assumes the consistency of a thick paste, to which I add about half a bushel of the meal of malt, which brings it into a saccharine state. It is then submitted to the previously described process for obtaining the requisite fermentation. In operating upon rice by this mode, the same proportions may be used.

Having thus described the nature of the invention, and the manner of performing the same, I would have it understood, that I do not confine myself to the exact proportions of materials herein described to be used in the making of vinegar, although I believe them to be the best; but what I claim as the invention communicated to me is, first, the mode of making vinegar by the application of potatoes, as above described; and,

Secondly, the mode of making vinegar by the application of rice, as above described.—In witness whereof, &c.

Enrolled February 1, 1841.

NOTICE OF EXPIRED PATENTS.

(*Continued from page* 374, *vol. xii.*)

Goldsworthy Gurney, of Argyle Street, Hanover Square, London, Surgeon, for certain improvements in locomotive engines, and the apparatus connected therewith.—Sealed October 11, 1827.—(*For account of specification, see Repertory, Vol. 7, third series, p.* 279.)

James Stokes, of Cornhill, London, Merchant, for improvements

in making, boiling, burning, clarifying, or preparing raw or Muscovado bastard sugar and molasses—Sealed October 11, 1827.

John Wright, of Princes Street, Leicester Square, London, Engineer, for improvements in window-sashes.—Sealed October 11, 1827.—(*For account of specification, see Repertory, Vol. 7, third series, p. 423.*)

James Smethurst, of New Bond Street, London, Lamp Manufacturer, for an improvement or improvements upon lamps—Sealed November 6, 1827.

Frederick Foveaux Weiss, of the Strand, Westminster, Surgeon's Instrument Maker, for improvements in the construction of spurs.—Sealed November 6, 1827.

James White, of Paradise Street, Lambeth, Surrey, Engineer, for a machine or apparatus for filtering, which he denominates an artificial spring.—Sealed November 8, 1827.—(*For account of specification, see Repertory, Vol. 8, third series, p. 11.*)

John Platt, of Salford, Lancashire, Fustian Dresser, for improvements in machinery for combing wool and other fibrous materials. Communicated by a foreigner residing abroad.—Sealed November 10, 1827.

William Collier, of Salford, Lancashire, Fustian Shearer, for improvements in the power-loom for weaving. Communicated by a foreigner residing abroad.—Sealed November 10, 1827.

John Walker, of Weymouth Street, Mary-le-bone, Esquire, for an improved castor for furniture.—Sealed November 17, 1827.—(*For account of specification, see Repertory, Vol. 8, third series, p. 13.*)

Henry Pinkus, of Philadelphia, America, Gentleman, for an improved method of purifying carburetted hydrogen gas, for the purpose of illumination.—Sealed November 17, 1827.

Samuel Sevill, of Brownshill, Gloucestershire, Clothier, for improvements applicable to raising the pile, and dressing woollen and other cloths.—Sealed November 20, 1827.

Robert Wheeler, of High Wycomb, Bucks, Brewer, for an improvement or improvements on or in refrigerators for cooling fluids. —Sealed November 22, 1827.

William John Dowding, of Poulshot, Wilts, Clothier, for improvements in machinery for rolling, or rolling wool from the carding engine.—Sealed November 22, 1827.

John Roberts, of Wood Street, Engineer, and George Upton, of Queen Street, Cheapside, London, Oil Merchant, for improvements on Argand and other lamps.—Sealed November 24, 1827.

John Alexander Fulton, of Lawrence Pountney Lane, London, Spice Merchant, for a process of preparing or bleaching pepper.—Sealed November 26, 1827.

Joseph Apsey, of John Street, Waterloo Road, Lambeth, Engineer, for an improvement in machinery to be used as a substitute for the crank.—Sealed November 27, 1827.

Joshua Jenour, Junior, of Brighton Street, St. Pancras, Middlesex, Gentleman, for a cartridge or case and method of more advantageously enclosing therein shot or other missiles for the purpose of loading fire-arms and guns of different descriptions.—Sealed November 28, 1827.—(*For account of specification, see Repertory, Vol.* 8, *third series, p.* 15.)

Thomas Bonner, of Monkwearmouth Shore, Durham, Merchant, for improvements on safety lamps.—Sealed December 4, 1827.—(*For copy of specification, see Repertory, Vol.* 8, *third series, p.* 395.)

William Fawcett, of Liverpool, Engineer, and Matthew Clarke, of Jamaica, Engineer, for an apparatus for the better manufacture of sugar from the canes.—Sealed December 4, 1827.—(*For copy of specification, see Repertory, Vol.* 7, *third series, p.* 267.)

Robert Water Winfield, of Birmingham, Brass Founder, for an improvement or improvements in tubes or rods, produced by a new method or methods of manufacturing, and in the construction or in the constructions only, and for manufacturing the same with various other improvements into parts of bedsteads and other articles.—Sealed December 4, 1827.

John Meadow, of Millbrook, near Southampton, Coach Maker, for improvements on wheels for carriages.—Sealed December 4, 1827.

Samuel Wilkinson, of Holbeck, Yorkshire, Mechanic, for improvements in mangles, which he intends to denominate "Bullinan's Patent Cabinet Mangles."—Sealed December 4, 1827.—(*For account of specification, see Repertory, Vol.* 8, *third series, p.* 149.)

Maurice de Jough, of Warrington, Lancashire, Cotton Spinner, for an improvement or improvements in machines adapted for spinning, doubling, twisting, roving, or preparing cotton and other fibrous substances.—Sealed December 4, 1827.

Thomas Tyndall, of Birmingham, Gentleman, for improvements in the manufacture of buttons, and in the machinery or apparatus for manufacturing the same, communicated to him by a foreigner—Sealed December 4, 1827.

Daniel Ledsam and William Jones, of Birmingham, Manufacturers, for improvements in machinery for cutting sprigs, brads, and nails.—Sealed December 4, 1327.—(*For account of specification, see Repertory, Vol.* 8, *third series, p.* 73.)

(*To be continued.*)

LIST OF NEW PATENTS.

John Chater, of the town of Nottingham, Machine Maker, and Richard Gray, of the same place, Lace Manufacturer, for improvements in machinery for the purpose of making lace and other fabrics traversed, looped, or woven.—Sealed June 26, 1841.—(*Six months.*)

Willoughby Methley and Thomas Charles Methley, of Frith Street, Soho, Ironmongers, for improvements in machinery for raising, lowering, and moving bodies or weights. Communicated by a foreigner residing abroad.—Sealed June 26, 1841.—(*Six months.*)

Moses Poole, of Lincoln's-Inn, Gentleman, for improvements in producing and applying heat. Communicated by a foreigner residing abroad.—Sealed June 26, 1841.—(*Six months.*)

William Losh, of Little Benton, Northumberland, Esquire, for improvements in the manufacture of railway wheels.—Sealed June 26, 1811.—(*Six months.*)

Nathaniel Benjamin, of Camberwell, Gentleman, for improvements in the manufacture of type. Communicated by a foreigner residing abroad.—Sealed June 28, 1841.—(*Six months.*)

William Knight, of Durham Street, Strand, Gentleman, for an indicator for registering the number of passengers using an omnibus or other passenger vehicle.—Sealed June 28, 1841.—(*Six months.*)

Christopher Nickels, of York Road, Lambeth, Gentleman, for improvements in the manufacture of mattrasses, cushions, paddings, or stuffings, and in carpets, rugs, and other napped fabrics.—Sealed June 28, 1841.—(*Six months.*)

William Thomas Berger, of Upper Homerton, Gentleman, for improvements in the manufacture of starch, —Sealed June 28, 1841.—(*Six months.*)

Thomas Machell, of Soho Square, Surgeon, for improvements in raising and conveying water and other fluids.—Sealed June 28, 1841.—(*Six months.*)

George Henry Phipps, of Deptford, Engineer, for improvements in the construction of wheels for railway and other carriages.—Sealed July 2, 1841.—(*Six months.*)

Thomas Hager, of Kensington, Brewer, for an improved bagatelle board.—Sealed July 7, 1841.—(*Two months.*)

George Onions, of High Street, Shoreditch, Engineer, for improved wheels and rails for railroad purposes. —Sealed July 7, 1841.—(*Six months.*)

Robert Mallet, of Dublin, Engineer, for certain improvements in protecting cast and wrought-iron and steel, and other metals, from corrosion and oxidation, and in preventing the fouling of iron ships, or ships sheathed with iron, or other ships or iron buoys in fresh or sea water.—Sealed July 7, 1841.—(*Six months.*)

William Edward Newton, of Chancery Lane, Civil Engineer, for certain improvements in the manufacture of fuel. Communicated from a foreigner residing abroad. —Sealed July 7, 1841.—(*Six months.*)

Thomas Fuller, of the City of Bath, Coach Maker, for certain improvements in retarding the progress of carriages under certain circumstances.—Sealed July 7, 1841.—(*Six months.*)

Andrew M'Nab, of Paisley, North Britain, Engineer, for an improvement or improvements in the making or construction of meters or apparatus for measuring water or other fluids.—Sealed July 7, 1841.—(*Six months.*)

Charles Wheatstone, of Conduit Street, Gentleman, for improvements in producing, regulating, and applying electric currents.—Sealed July 7, 1841.—(*Six months.*)

John Steward, of Wolverhampton, Esquire, for certain improvements in the construction of piano-fortes.—Sealed July 7, 1841.—(*Six months.*)

Thomas Young, of Queen Street, London, Merchant, for improvements in lamps.—Sealed July 9, 1841.—(*Six months.*)

Charles Payne, of South Lambeth, Chemist, for improvements in preserving vegetable matters where metallic and earthy solutions are employed.—Sealed July 9, 1841.—(*Six months.*)

William Henry Phillips, of Manchester Street, Manchester Square, Civil Engineer, and David Higginbottom, of the same place, Gentleman, for certain improvements in the construction of chimneys, flues, and air-tubes, with the stoves and other apparatus connected therewith, for the purpose of preventing the escape of smoke into compartments, and for warming and ventilating buildings.—Sealed July 13, 1841.—(*Six months.*)

Benjamin Beale, of East Greenwich, Kent, Engineer, for certain improvements in engines to be worked by steam, water, gas, or vapours.—Sealed July 13, 1841.—(*Six months.*)

Moses Poole, of Lincoln's Inn, Gentleman, for improvements of steam baths and other baths. Communicated by a foreigner residing abroad.—Sealed July 13, 1841.—(*Six months.*)

Miles Berry, of Chancery Lane, Civil Engineer, for improvements in the construction of locks, latches, or such kind of fastenings for doors and gates and other purposes, to which they may be applicable. Communicated by a foreigner residing abroad.—Sealed July 14, 1841.—(*Six months.*)

Thomas Peckston, of Arundel Street, Strand, Bachelor of Arts, and Philip Le Capelain, of the same place, Coppersmith, for certain improvements in meters for measuring gas and other aeriform fluids.—Sealed July 14, 1841.—(*Six months.*)

Andrew Smith, of Belper, Derby, Engineer, for certain improvements in the arrangement and construction of engines to be worked by the force of steam or other fluids, which improved engines are also applicable to the raising of water and other liquids.—Sealed July 21, 1841. (*Six months.*)

John M'Bride, Manager of the Mersery Spinning Mills, Hutchesontown, Glasgow, for certain improvements in the machinery and apparatus for dressing and weaving cotton, silk, flax, wool, and other fibrous substances.—Sealed July 21, 1841.—(*Four months.*)

John White Welch, of Austin Friars, Merchant, for an improved reverberatory furnace, to be used in the smelting of copper-ore, or other ores, which are or may be smelted in reverberatory furnaces.—Sealed July 21, 1841.—(*Six months.*)

Frederick Theodore Philippi, of Belfield Hall, Calico Printer, for certain improvements in the production of sal-ammoniac, and in the purification of gas, for illumination. Communicated by a foreigner residing abroad.—Sealed July 21, 1841.—(*Six months.*)

William Ward Andrews, of Wolverhampton, Ironmonger, for an improved coffee-pot.—Sealed July 21, 1841.—(*Six months.*)

William Newton, of Chancery Lane, Civil Engineer, for certain improvements in machinery for making pins and pin nails. Communicated by a foreigner residing abroad.—Sealed July 28, 1841.—(*Six months.*)

Anthony Bernhard Von Rathen, of Kingston-upon-Hull, Engineer, for improvements in high pressure, and other steam-boilers, combined with a new mode or principle of supplying them with water.—Sealed July 28, 1841.—(*Six months.*)

Anthony Bernhard Von Rathen, of Kingston-upon-Hull, Engineer, for a new method or methods (called by the inventor, "The united Stationary and Locomotive System") of propelling locomotive carriages on railways and common roads, and vessels on rivers and canals, by the application of a power produced or obtained by means of machinery and apparatus unconnected with the carriages and vessels to be propelled.—Sealed July 28, 1841.—(*Six months.*)

TO THE

SUBSCRIBERS AND READERS

OF THE

REPERTORY OF ARTS

And Patent Inventions.

The Proprietor of the "Repertory of Arts and Patent Inventions" being desirous to render the publication more and more useful to the public, feeling that by so doing he will materially add to the extent of the sale, has determined to increase the size of the monthly parts by adding sixteen pages, without any additional charge, and in order to mark the period of this change, he has determined to commence a new series on the first day of January next. He is the more induced to take this course, as many of the parts of all the previous series are out of print; hence persons desirous of taking this work are prevented by not being able to obtain a complete set. Persons, therefore, wishing to take the work will now have an opportunity of commencing under the most favourable circumstances.

The Proprietor takes this opportunity of calling attention to one important peculiarity of this work, which is, that the specifications published are actual copies of those enrolled, and although there are several publications which profess to give reports of patented inventions, there is none other which gives the specifications entire, the value of which has long been extensively appreciated by the public, and the courts of law prefer the printed specifications to written copies. To persons interested in patents and manufactures it is of the greatest importance that the exact wording of a specification should be before them, without which no correct knowledge can be obtained of what a patentee really claims, and persons have often been led into difficulties by depending on partial statements published of inventions secured by patent. Nothing can be more injurious than

to read the garbled statements (often unfairly given) of the specifications of patents. In drawing a specification for a patent it is absolutely necessary that the patentee should be well and accurately informed of the claims of previous patentees, in order that he may not injure his own rights; he cannot safely trust to any other statement of previous patents than the exact wording of the specifications as enrolled. The manufacturer, who is constantly progressing with the improvements of the day, cannot safely put any new process or machinery into practice unless he have first made himself acquainted with the various patents which are in force, and he can only be made fully acquainted with the various inventions relating to his particular manufacture by reading the precise words of the specifications. Cases might here be given of manufacturers who, depending on the information of the published reports, and not finding them to include the improvements which they have been desirous of putting to work, have proceeded to do so, when, after having expended large sums of money, they have received notice perhaps of an injunction or of law proceeding for infringement of some patent, the report of which did not contain a full or accurate statement of the particular patent; and other manufacturers have taken patents for improvements of their machinery or their processes, and when they have come to specify their inventions they have been for the first time informed of the extent of a previous patent, the report of which they were well acquainted with, but which in no way conveyed a full or a correct view of the claims of invention made by a previous patentee. Hence have the *verbatim* copies of specifications published by the "Repertory" long been received as of the greatest value to the inventor, the patentee, and the manufacturer.

Another important feature in the "Repertory of Arts and Patents for Inventions" has been the reports of law proceedings in patent cases, which have appeared from time to time as causes have been decided in the courts of law and equity. Nothing has tended so much to inform the public of the value of patent property as these reports—for the most part exclusively made in this work—and although the Proprietor feels it desirable to in-

crease the number of specifications published monthly, and intends to do so to the greatest possible extent, yet it is intended, in the first instance, to appropriate a large part at least of the increase of the pages to the publication of all the patent cases, commencing with the earliest period. By this means the patentee, the inventor, and the manufacturer, will become more intimately acquainted with the protection offered by law to patentees. Till within the last twenty years little confidence was placed in this department of the law, in consequence of the number of patents which had from time to time been set aside, and the still larger number where the patentees, in consequence of the erroneous manner in which their specifications had been drawn, were afraid to come before a court of law, and suffered infringements to pass with impunity. It will readily be seen that nothing will tend more to the obtaining a correct knowledge of the law of patents for inventions than the publishing of all the reports of patent cases, together with correct copies of the specifications which have been called in question. A patentee about to have a specification enrolled, possessed of such information, will see how particular specifications have been drawn; he will see the objections which have been made thereto by counsel; he will ascertain the weight of those objections by the judgments of the courts, and he will be able more correctly than at present to judge whether his specification is drawn in a manner to avoid objections of a substantive character being made thereto, and he will the better be able to judge whether his invention is fully described, and whether the claims made comprehend the whole spirit of the invention. It is not enough simply to describe the details of an invention. If such a course had been pursued in the specifications of many of the modern cases, the patentees would have been deprived of much of the value of their patents.* The manufacturer has equal interest in knowing the law as applied to particular cases, otherwise he can never judge when he is

* See the cases of Russell *v.* Cowley, Minter *v.* Wells, Jupe *v.* Pratt, Morgan *v.* Seaward, and many others; in none of which cases had the defendants followed the specification, but they were using the general principle or peculiar character of the inventions described.

safe in putting new inventions into practice. At present such reports of patent cases as have been printed, excepting the modern ones, which have appeared in this work, are diffused over very many volumes of law books, to which few inventors, patentees, or manufacturers have an opportunity of access; hence, for all practical purposes to those who are most interested, the law reports of patent cases may be considered as a sealed book. The Proprietor of this publication being aware that Mr. W. Carpmael had what is believed to be the only manuscript copy and short-hand notes of the various reports of patent cases which have taken place from the earliest periods, has prevailed on that gentleman to publish the same, together with the specifications of the patents in question; and the Proprietor has great pleasure in stating to his readers that Mr. Carpmael has undertaken to supply sufficient matter monthly for several pages, which it is proposed shall be stitched up with the monthly parts of the "Repertory," and may be bound therewith; at the same time the parts of the law reports will be paged in such manner as to be bound up as a separate work, for which purpose there will be a proper title-page and introductory preface.

The Proprietor proposes also to infuse fresh spirit in the other matters of interest for which this work has long been known, and generally the Proprietor pledges himself that no exertion shall be wanting in rendering the work more useful to the public.

Persons desirous of commencing to take in this work, have only to order it of any bookseller in town or country, and they will be regularly supplied. Patentees who wish to have their specifications published, will be so good as to favour the Editor with the enrolled copy, with the drawings, if any (of which great care will be taken), and the same will be published without any charge; and patentees may have any number of printed copies of their specifications and drawings separate, at a very small cost.

This work will be found useful as a channel for advertisements, particularly in all matters relating to patents and manufactures.

November 10, 1842.

Macintosh, Printer, 20, Great New street, London.

THE

REPERTORY

OF

PATENT INVENTIONS.

No. I. ENLARGED SERIES.—JANUARY, 1843.

Specification of the Patent granted to THOMAS HEDLEY, *of Newcastle-upon-Tyne, Gentleman, and* CUTHBERT RODHAM, *of Gateshead, in the County of Durham, Millwright, for an Apparatus for Purifying the Smoke, Gases, and Noxious Vapours arising from certain Fires, Stoves, and Furnaces.*—Sealed March 7, 1842.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—Our invention relates to a mode of constructing an apparatus for purifying by washing the smoke, gases, and vapours of such fires, stoves, and furnaces, as during the process of combustion emit smoke, gases, or vapours highly charged with unconsumed carbon or chemical mineral and metallic matters of a noxious character. And in order that our invention may be most fully understood and readily carried into effect, we will proceed to describe the drawing hereunto annexed, first remarking, that we are aware that many attempts have been made to purify the smoke, gases, and vapours arising from the fires, stoves, or furnaces of manufactories, works, and buildings, by means of water, particularly copper and

lead works, and some chemical works, also steam-engine boiler and other furnaces, but we believe without success, owing to the mode of applying the water having materially injured or destroyed the draft of the flues and chimney, and the application of water for such purposes has in many cases been abandoned. Now according to our invention, the smoke, gases, and vapours arising from fires, stoves, and furnaces when of a highly impure character are effectually purified, and the draft of the flues is improved, and the deposit of matters or solid particles separated from the water will be of value.

Description of the Drawing.

The drawing represents the section and plan of an apparatus constructed according to our invention, and it will be seen to consist of a series of ascending and descending flues connected with each other, as hereafter explained. The vapours, gases, and smoke arising from one or more fires, stoves, or furnaces, are made to pass through these flues, and then the purified products evolve from the chimney or other vent, and the apparatus is so arranged that streams or showers of water are caused to descend and mix with the vapours, gases, and smoke in the descending flues, by which means the vapours, gases, and smoke are washed and forced downwards. In the ascending flues no water is applied, consequently the vapours, gases, and smoke freely ascend, without any interruption, which they would not do if they were opposed by water falling upon them in their upward course, and it will be seen that the descending flues are placed so far apart from the ascending flues as to leave sufficient room to turn an arch at the top in a sloping or inclined direction downwards, and the partitions which divide the ascending from the descending flues are rounded at their lower ends, the effect of which will be found to be that the rush of water down the descending flues will cause a quick and powerful draft in the ascend-

ing flues; and that the vapours, gases, and smoke will be purified by mixing with and being washed by the water in their downward course, and the draft in the ascending flues will at the same time be so powerful that the partly purified smoke, gases, and vapours will rush up the ascending flues. *a, a,* is the flue which comes from the fire, stove, or furnace to which the apparatus is applied. *b, b,* is an ascending flue leading to and turning over into the descending flue, *d,* by a flue, d^2, sloping down from the spring of the arch at the top of the flue, *b, b.* Above the flue, *d,* is placed a water box with a perforated plate at the bottom, d^1, through which the water in streams or showers passes down the flue, *d,* and mixing with the vapours, gases, and smoke, force them downwards and increase the draft in the ascending flue, *b, b,* in consequence of the flue or passage, d^2, connecting the ascending flue, *b, b,* with the descending flue, *d,* being sloped or inclined downwards from the spring of the arch at an angle, as is shown in the drawing. It should be observed, that round the inside of the descending flues are ledges or projections, *n, n,* of an inch to an inch and a-half in breadth of brick, stone, slate, or other suitable material, which are placed at a distance of from three to four feet from each other, with an edge slanting down to prevent the possibility of any gases, vapours, or smoke escaping the water and passing up by the sides of the flue. The gases, vapours, and smoke in their downward passage become partly purified, and the matters carried thereby are separated and mix with the water, which passes into the tank or reservoir marked D, D, D, in figure 2, through the side apertures, *k, k, k, k,* at the bottom of the flues, and are run off by a sluice at the end into other reservoirs where the water is gradually drained off, and the matter so separated from the gases, vapours, and smoke removed. The water in the tank or reservoir, D, D, D, is so regulated by the sluice at the escape end as to stand as high above the aperture at the bottom of the

flue, *d*, as will leave the passage into the ascending flue, *e*, *e*, to be of the same dimensions as the ascending and descending flues. The surface of the water being above the level of the aperture, *k*, forms a bottom to the flue, and offers such resistance to the current of gas, vapour, and smoke, then partly purified in its progress down the flue, *d*, as to cause it to pass round, into, and ascend up the flue, *e*, *e*, which communicates with the flue, *d*, at the lower end. The vapours, gases, and smoke then rise freely up the flue, *e*, *e*, in consequence of a strong draft being kept up in that flue by its opening into the descending flue, *f*, *f*, at its upper end, by a second inclined connecting flue, e^1, sloping downwards from the spring of the arch, where the smoke, gases, and vapours are forcibly driven down the descending flue, *f*, *f*, by another strong shower or stream of water rushing from another perforated box placed at the top of the flue, *f*, *f*, which mixes with further washes and purifies the gases, vapours, and smoke, and passes into the tank or reservoir, D, D, D, by the apertures, *k*, at the bottom of the flue. The surface of the water in the tank being also kept so far above the apertures at the bottom of the flue, *f*, *f*, as to leave a passage equal to the size of the flues for the gases, vapours, and smoke to pass round into and to ascend up the flue, *g*, *g*, (which communicates with flue, *f*, *f*, at the lower end,) in consequence of the draft being kept up in the flue, *g*, *g*, by its opening into the descending flue, *h*, *h*, at its upper end, by a third inclined connecting flue sloping downwards from the spring of the arch where the gases, smoke, and vapours are forcibly driven down the descending flue, *h*, *h*, by another strong shower from a similar perforated box or cistern placed at the top of this flue, which mixes with and further washes the gases, vapours, and smoke in the same manner as above described, and a further deposit is made which flows through the opening at the bottom of this flue into the tank or reservoir, D, D, D. The process will be

repeated until the gases, vapours, and smoke are perfectly purified, and are then evolved from the chimney or other outlet in an innoxious state, and the deposited matters are removed from the tanks or reservoirs. It should be stated, that the apparatus here shown and described is intended to be applied to the flue of a furnace used in the manufacture of sulphate of soda, but it is equally applicable to other work and manufactory where noxious vapours and smoke evolve from the flues or chimneys where a considerable quantity of smoke is generated, or where mineral or metallic or other noxious matters are evolved into the atmosphere. In such cases, when the invention is applied the purified vapours only are allowed to escape, the metallic and other matters previously carried by the gases, smoke, or vapours being separated by the washings with water and deposited. Although the apparatus is shown to be constructed of iron, brick, and stone, we do not confine ourselves thereto, as other suitable materials may be used. In some cases, where the impurities are not easily separated, we apply a series of jets forming a sheet of water in an oblique direction, within the first inclined or descending flue, *a*, *a*, as is shown at *i*, *i*, and we also apply jets of steam in some of the ascending flues, as is shown at *m*, *m*, such jets of steam mixing with the gases, vapours, and smoke, assists the washing process and quickens the draft in those flues; but these are not essential to our invention. *k*, *k*, *k*, *k*, are the apertures from the flues into the reservoir or tank, D, D, D. *o*, is a damper to regulate the draft; *l*, is a pipe for supplying water to the water boxes, and the water is supplied by pipes from a reservoir or by pumps. We would remark, that this apparatus is not intended to be applied to small fires, stoves, or furnaces for domestic purposes, but is intended for factories and extensive works where the quantities of impurities are very great.

Having thus described our invention, and the manner

in which the same is to be performed, we would have it understood that what we claim as our invention is,

First, the mode of constructing an apparatus for purifying vapours, gases, and smoke arising from certain fires, stoves, and furnaces, by combining two or more ascending flues with descending flues by inclined or sloping flues or passages at their upper ends, with streams or showers of water to fall down the descending flues into suitable reservoirs below, leaving a space above the water in such reservoirs for the passage of the gases, smoke, and vapours to pass into the next ascending flue, as above described; and,

Secondly, we claim the combining an ascending flue and a descending flue by means of an inclined passage or flue at the upper parts thereof, in such cases as have water descending down a descending flue to purify gases, vapours, or smoke from certain fires, stoves, and furnaces, as above described.—In witness whereof, &c.

THOMAS HEDLEY.
CUTHBERT RODHAM.

Enrolled September 7, 1842.

Specification of the Patent granted to JOHN READ, *of Regent-street, in the County of Middlesex, Machinist,* HENRY PUTLAND, *of Hurst-green, in the County of Sussex, Farmer, and* CHARLES WOODS, *of Fore-street, Cripplegate, in the County of Middlesex, Commercial Traveller, for Improvements in the Construction and Make of Driving Reins, Harness Bridles, and Reins, and in Bridles and Reins for Riding.*—Sealed April 6, 1842.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—

Our invention relates to a mode of constructing or making reins and bridles in such manner that a rein or bridle is made capable of acting on two powers of leverage of the same bit, or on two bits used at the same time, whereby a horse will, under ordinary circumstances, be governed and restrained by a lesser power of a bit, but when that is not sufficient to control and govern a horse, the strain of the bridle or rein will be brought to act on a more powerful leverage of the bit or bits used, and thus, by the employment of one rein or bridle in the hand, a person driving or riding will have equal power over a horse to what has heretofore been obtained by using two reins or bridles, in connexion with two different powers of leverage in the same bit, or with two different bits. And in carrying out our invention, each end of a rein or bridle is constructed and made with two means of attachment to a bit or bits, one attachment being made to a more powerful part of the bit, and the other means of attachment being caused to act on a lesser power of leverage of the bit, through an elastic medium—which, however, is of sufficient strength for the ordinary purposes of riding or driving—such elastic medium giving way when a more powerful action of the bit or bits employed is necessary to restrain or govern a horse, and thus allowing the more powerful action of leverage of the bit or bits to be brought into use. In order that our invention may be most fully understood and readily carried into effect, we will proceed to describe the drawing hereunto annexed.

Description of the Drawing.

Fig. 1, represents a sketch of a horse's head, having a driving-rein applied thereto, constructed according to our invention.

Fig. 2, shows another sketch of a horse's head, having a bridle or rein for riding applied thereto, constructed according to our invention. We have not thought it necessary to show reins and harness bridles for driving

horses in double harness, and for riding post, they being similar, so far as our improvements are concerned, to what are shown in figures 1 and 2, and the description hereafter given will be sufficient to enable a workman to make such descriptions of driving reins, and harness bridles and reins, and bridles or reins for riding. *a*, *a*, fig. 1, represents a rein for driving, and the same letters in fig. 2, also represent a bridle or rein which is held by the person riding; and it will be seen that from the point, a^1, the rein, and also the bridle held by the hand, is single, and is of the ordinary construction; but at the point, a^1, it branches into two parts, *b* and *c*, the part, *b*, being attached at a more powerful part of the leverage of the bit or bits, than the part, *c*; and the part, *b*, hangs slack and out of use under ordinary circumstances; and the horse will be controlled and governed by the rein or bridle acting on the lesser power of leverage of the bit or bits; but when from any circumstances a greater power of action on the bit or bits is required to govern or control a horse, then, owing to the attachment of the part, *c*, of a rein or bridle being through an elastic or yielding medium, the part, *c*, elongates, and allows of the part, *b*, of a rein or bridle being brought into action, and thus obtain a more powerful use of the bit by simply pulling on the same rein or bridle, *a*.

Fig. 3, shows a plan or external view of the part, *c*, of a rein or bridle, full size.

Fig. 4, is a section of the same parts; and,

Fig 5, is another section, the spring used as the elastic medium being drawn out of the cover, in order to show the means of removing it to be cleansed. *d*, is a spring coiled round the part, *c*, of a rein or bridle, having a metal stop at *e*, rivetted or otherwise fastened to the end of the part, *c*, of a rein or bridle, and that end of the spring rests against that stop. c^1, is a case for the spring, having a metal ferule or stop fixed at one end, as is shown at c^2. The case, c^1, is attached by means of a strap and

buckle, to the lesser leverage of the bit, as is shown; and it will be readily understood, that on pulling the rein or bridle, *a*, unless the strain required be considerable, the power will only act on the bit at the lesser leverage; but when circumstances require a more powerful action of the bit or bits, in order to restrain or govern a horse, then the elastic resistance of the spring will be overcome, and the part, *b*, of the rein or bridle at each end, will be brought into action; and when the greater force of action of the bit is no longer necessary, then, by slackening the hold of the rein or bridle, the springs will expand, and the horse will be governed by the lesser power of the bit. It will thus be obvious, that by a single rein or bridle in the hand, a person driving or riding will have all the power of two reins or bridles now resorted to, and there will be the further advantage, that the two powers of a bit or bits acted on by the same rein or bridle, will be more readily and immediately brought into action than when two reins or two bridles are used. When using two bits, then the part, *b*, at each end of a bridle or rein, is to be attached to the bit having a curb; and the part, *c*, at each end of a bridle or rein, is to be attached to the bit without a curb.

We would remark, that although we have thus been particular in describing and showing all the details of the means we prefer for carrying out our invention, we do not confine ourselves thereto, provided the peculiar mode of action of the parts be retained whereby the parts, *c*, of reins or bridles are caused to act through an elastic medium on the lesser power of the bit or bits used, thereby allowing such parts, *c*, to yield, when necessary, to bring the parts, *b*, of the reins or bridles into use, by the same hand part, for acting on greater powers of the bit or bits employed as above described. And we wish it to be understood, that what we claim is, the mode of constructing or making driving reins, harness bridles and reins, and bridles and reins for riding, by

forming thereon two means of attachment at each end thereof, the one to be attached to a more powerful part of the leverage, and the other to a less power of leverage of a bit, or two separate bits, the attachment to the lesser power of a bit being through an elastic medium, in order that the same may yield to allow of a greater power of action of bit being brought into use, as above described. —In witness whereof, &c.

JOHN READ.
HENRY PUTLAND.
CHARLES WOODS.

Enrolled October 6, 1842.

Specification of the Patent granted to EDWARD SLAUGHTER, *of Bristol, Engineer, for Improvements in the construction of Iron Wheels for Railway and other Carriages.*—Sealed March 4, 1842.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—

Description of the Drawing.

Fig. 1, is a wheel four feet in diameter, constructed according to my invention.

Fig. 2, is a section of the same.

Fig. 3, is a section across two abutting spokes, as at A, B; and

Fig. 4, is a section of the outer ring and crown of spoke, as at C, D. The same letters in all the drawings indicate the same parts. A, A, are the spokes. Any desired number may be used (I prefer eight for a four feet wheel) of malleable iron, rolled or otherwise manufactured, produced with a dovetail projection on the outer side, and bent (when hot) round a cast-iron block of any suitable

form, and of such dimensions that they may collectively serve as an inner framing to the wheel. B, is an outer ring also of malleable iron, furnished on its inner circumference with a dovetail recess, corresponding with the projecting dovetail of the spoke; but it will be evident that the recess may be formed in the spoke, and in that case the dovetail projection must be produced upon the outer ring. The making of the dovetail groove or the dovetail projection to the outer ring, B, may be made in various ways, such as by rolling or by forging, a hoop of iron being formed, the dovetail groove or the dovetail projection thereto may be turned in the lathe to the form shown in the drawing; but I make no claim to the forming dovetail grooves or dovetail projections in or on bars of iron, that being no part of my invention. C, is the nave which is cast round the spoke ends, when placed together within the ring, B. When the outer ring has been hooped or welded, so as to form a perfect hoop, the space, D, where the weld was taken, is dressed out on the face side of the wheel, of just sufficient width to receive the circular end of one end of the spokes, thereby leaving the dovetailed recess perfect throughout its entire inner circumference. The outer ring is then made hot, and one of the spokes dropped into the slot, the dovetail recess of the ring being a little expanded, the spoke is readily entered and left there; a second spoke is entered and passed completely round, till it is placed in contact with the first; a third is placed against the second, and the same method being adopted for all the spokes, till all the spokes are introduced into the ring, B. The framing of the wheel is then completed. Previous to running the metal round the ends of the spokes to form the nave, the wheel is perfected by being placed upon a cast-iron table of suitable dimensions, with clamps and screw bolts to maintain it in the shape and figure represented in *fig.* 1, care being taken that that portion of the spoke contained

between *e* and *f*, be made sufficiently round to meet the contraction of the nave. The slot at D, is then filled with a piece of metal, driven into which will occupy all the space between two spokes for the entire depth from the face to the bottom of the dovetailed recess, and maintained in that position by one or more tap bolts, which, in addition to the natural shrinkage upon each spoke end, will effectually prevent the wheel from turning in the outer ring.

I would remark, that the figure or shape of the dovetail might be varied; I do not, therefore, confine myself to that shown and described. The shapes of the spokes may be varied. I hereby declare that I claim as my invention the framing a wheel for railways or common roads, with an outer ring, having a dovetail groove or recess, and spokes having a corresponding projection dovetail, or *vice versa*, with spokes having a dovetail groove or recess, and an outer tyre having a projecting corresponding dovetail, so that the wheel shall be held together by means of dovetails to the spokes and rings, as above explained.—In witness whereof, &c.

EDWARD SLAUGHTER.

Enrolled September 4, 1842.

Specification of the Patent granted to JOSEPH CLISILD DANIELL, *of Twerton Mills, near Bath, Clothier, for Improvements in making and preparing Food for Cattle.* —Sealed March 31, 1842.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My said improvements consist, First, in the mode hereinafter described of preparing and treating certain sub-

stances hereinafter set forth, in order to render such substances fit to be used as food for cattle. Such substances may for the sake of description be designated ligneous matter, because it is in all cases of the nature of wood, and such ligneous matter comprises all kinds of wood; but that which I have found best calculated for the purpose is such as is commonly called under or coppice-wood, either oak, ash, maple, sycamore, or hazle-wood, brushwood, hedgewood, brambles, furze, gorse, heath, or any other fibrous matter of the nature of wood, possessing the qualities of those above stated, and which, when prepared as hereinafter stated, will be applicable as food for cattle.

Secondly, in the mode of treating and preparing grass, either common grass or lucerne, sainfoine (or French grass), green clover, or green vetches; also, either wheat or barley straw, bean or pea haum, or straw vetch, or any other sort of straw or haum, or hay, such as may be used as fodder for cattle, after being treated according to my said improvements, or part thereof, as hereinafter set forth.

The mode of preparing such substances designated ligneous matter, as aforesaid, in order to constitute them food for cattle, according to my improvements or part thereof, consists in reducing the same to a state of fine powder, by any machinery or series of machines adapted for cutting, bruising, and grinding such ligneous matter as aforesaid, to a state of fine powder; and suitable machinery for such purpose is hereinafter mentioned and referred to. In order to reduce such ligneous matter to a state of fine powder, when such powder will be fit food to be given to cattle, I take the wood (if under or coppice wood), such being cut the whole length of the growth, and not cut into short lengths as when made into faggots, and put it into a machine such as is used for cutting hay into chaff, but made much stronger, for the purpose of cutting under or coppice-wood into fragments, the large

sticks of which require stronger machinery for that purpose than hay, or even furze, heath, or smaller wood. (This machine is represented in the drawings annexed to the specification of a former patent taken out by me, entitled, "Improvements in the manufacture of manure, or a composition to be used on land as a manure.") When it is reduced into fragments by passing it through the machine above mentioned, and which is done exactly in the same manner as in cutting hay or straw and chaff, I run it through a machine made similar to a coffee mill or malt mill, but made much larger, and strong, and similar to that used by tanners in grinding bark. This machine also is represented in the drawings annexed to the specification above referred to. I then run it through another machine of a similar form, only made finer in its cutting parts, in order still further to reduce the fragments. I then pass the wood so reduced as above stated, through a pair of millstones, such as are commonly used for grinding flour. After it is so reduced by passing through the millstones as above stated, it is to be then passed through a miller's screen, such as is used by millers in separating the sharps from the gurgeons and the bran; the finer sort of wood so treated will be then fit to be used as food for cattle. The second sort, which passes through that part of the screen which separates the gurgeons from the bran, may be mixed again with the coarser sort (which does not pass through either screen), and be again passed through the millstones with a small quantity of the wood added, in the state it is after passing through the third machine, as above, to facilitate the grinding, until it is sufficiently reduced, by grinding and screening, for food for cattle.

Note.—When either gorse, heath, brambles, or brushwood is used, it is to be cut close to the stock or stouel, the same as under or coppice-wood is cut; and it does

not require so strong a machine for first cutting it into fragments as the under or coppice-wood requires; most of the common chaff machines would be sufficiently strong for that purpose; but in all respects it is to be treated, in reducing it for the purpose of food for cattle, as the under or coppice-wood before described.

And, *Note.*—As none of the ligneous matter above described can conveniently be reduced to powder in a perfectly green state, it should be partially dried after cutting from the stock or stouel, in order to get it to pass freely through the millstones, by which it is to be reduced to powder. And although it may be used at any time before it decays, provided it be kept perfectly dry, the sooner it is used after being cut and partially dried, as aforesaid, the better it will be; but gorse, or heath, or even oak, or any other wood of a bitter or unpleasant flavour, may be improved by being put on a kiln or in an oven, with a strong heat, before or after it is cut into fragments. The way and manner in which I prepare the grass and straw or haum, as aforesaid, is by taking a quantity of the straw or haum before described, in a dry state, and intimately mixing with it about or a little more than double its weight of grass (after it is cut in the usual manner, preparatory to making it into hay, and when free from external moisture). I then put both straw and grass into a tank or vat, surrounded by steam, as represented in the drawing hereunto annexed, and let it remain about twenty-four hours, by which time the straw will be saturated with the moisture arising from the grass, by action of heat produced by the steam which surrounds the tank or vat. I then pass or force a current of atmospheric air through the matters under process above described, by means of an air pump, represented in the drawing annexed, by which, after six or eight hours so forcing it, a considerable portion of the moisture will be carried off, when it may be taken out, and will be fit for immediate use; or it may be stacked for future use (but

care must be taken that the above materials, when taken out, should be thoroughly shaken abroad, so that the locks of grass may be divided and intimately mixed with the straw); but if the current of air passing through it should not sufficiently carry off the moisture, it may be exposed for a few hours to the sun or a dry wind, when it may be stacked or stored away in a barn or store-room, without any fear of its becoming fusty. But if it is put into stack without being dried after it is taken out of the vat, it should be sufficiently moist to allow it to heat enough to carry off such moisture; but to have it dried completely before stacking or storing away, is the safest plan.

Note.—In case the weather should not be favourable for drying it, if required to be dried in the open air, it may be put into a heap (and turned to prevent its getting fusty) until the weather serves.

Note.—If the grass should be partially dried before it is put into the tank or vat, it will require less straw to be mixed with it; or such grass may, if nearly dry, be put into the tank or vat by itself. Hay may be substituted instead of straw to mix with the grass when put into the tank or vat, and if bad hay, it very much improves it. Stout straw, or such as is hard and firm in its texture, will require longer time in the tank or vat to saturate it than thin or soft straw. If the grass and straw when taken out of the tank or vat were run through a thrashing-machine, it would very much improve its condition. The way in which I use the powdered wood in feeding cattle is (for horses), by mixing half a peck of ground wood or ligneous matter with a bushel of chaff, together with a pint of corn or barley-meal, if corn is usually given to such horses, and then given as the horses may require it, after being made moist by sprinkling it with a little water; or it may be steamed in the usual way that chaff is steamed by the feeders of cattle; or the powdered ligneous matter may be moistened before it is mixed with

the chaff, with a solution of eight ounces of soda in about a gallon of water, with a bushel of powdered ligneous matter. Horned cattle or sheep, about half a peck of powdered wood or ligneous matter, mixed with a bushel of chaff, and the same, after being sprinkled with water, or steamed or moistened with a solution of soda and water, as above, may be used alone, or may be mixed with about half a bushel of grains, or half a bushel of crushed potatoes, parsnips, carrots, turnips, or mangel wurzel, and if mixed with either of the last-mentioned, an additional quantity of from half a peck to a peck of the powdered ligneous matter may be added to such mixture.

For the feeding of store pigs, I use one bushel of grains, or crushed potatoes, parsnips, carrots, turnips, or mangel wurzel, with half a bushel of the powdered wood or ligneous matter together, mixed with the wash: or, I use instead of the grains or the last-mentioned vegetables, three pecks of the ground wood or ligneous matter, together with one peck of barley-meal mixed with the wash, or two pecks of bran or gurgeons mixed with two pecks of ground ligneous matter mixed with the wash.

For fatting pigs, instead of giving barley-meal in the usual way, I give barley-meal and ground wood or ligneous matter in equal quantities, mixed up with the wash.

Note.—When potatoes, parsnips, carrots, turnips, or mangel wurzel are given, they may be used in the raw state, or steamed in the usual way.

Having thus described the nature of my invention, and the manner in which the same is to be performed, I would have it understood, that what I claim is,

First, the mode of making and preparing food for cattle by pulverizing ligneous matters, and applying the same to feed cattle. And,

Secondly, I claim the mode of treating all kinds of

grass and straw or haum, or grass and hay, in a vat or tank, when preparing the same for the food of cattle, as above described.—In witness whereof, &c.

JOSEPH CLISILD DANIELL.

Enrolled September 30, 1842.

Specification of the Patent granted to FREDERICK HARLOW, *of Rotherhithe, in the County of Surrey, Carpenter, for Improvements in Paving or Covering Roads and other Surfaces, and in Machinery for Cutting the Materials to be used for those Purposes.*—Sealed February 9, 1842.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention relates, First, to a mode of combining and sustaining the various blocks of wood of which a pavement of a road or a footpath is formed, by the application of grooves and tongues, in the manner hereafter explained: and,

Secondly, my invention relates to a machine for forming grooves in blocks of wood used for paving roads and other surfaces, in order to receive tongues, according to the first part of my invention, and also for forming grooves in order to give horses or other animals a better foot hold: and in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the drawings hereunto annexed.

Description of the Drawings.

Fig. 1, represents the section of a roadway with footpaths.

Fig. 2, is a plan of the parts shown in fig. 1. *a, a, a,* are the blocks of wood of which the roadway is composed, the grain of the wood being vertical. *c, c,* being

tongues which are received in grooves formed in the blocks of wood, *a*, *a*, *a*, and the ends of these tongues, *c*, *c*, enter into grooves formed in the gutter-blocks, *d*, *d*; the two gutter-blocks, *d*, d^1, on each side of the roadway being combined together by tongues, *e*, *e*, in a direction longitudinally of the road, as is clearly shown. By these arrangements, combinations of grooves or tongues, the roadway will be retained very equal on the surface, as no single block can descend, each block being sustained by other blocks, by means of the tongues, as shown and explained. I would here remark, that fig. 1, shows the blocks in a vertical or nearly vertical position; but this is not a necessary position, as the blocks may be caused to incline, and have my invention applied thereto.

Fig. 3, shows the section of a roadway having the blocks inclining, one row of blocks across the road inclining in one direction, and the next row inclining in an opposite direction, as will readily be traced in the drawings: and it should be stated, that my invention does not consist in any particular form of block, but of a mode of combining and sustaining blocks of wood by means of grooves and tongues, as herein explained. *f*, *f*, are the kerb-stones. *g*, *g*, show the blocks of wood covering the footpaths, the grain being upwards; and such blocks are combined together by means of tongues and grooves, *h*, *h*, as is shown; and such tongues, *h*, may be of metal or wood; they are shown to be of hoop iron, let into saw cuts or narrow grooves. The tongues for the roadway I make of oak, or it may be of other wood.

Fig. 4, shows various views of the blocks of wood employed in constructing the roadway, fig. 1.

Fig. 5, shows part of a longitudinal section of the roadway.

Fig. 6, shows three views of a block of wood having the means of fastening a single block, which may become necessary in the event of having to remove one from the roadway, in order to mend a water or other pipe, this

block has a hole formed through it, into which two plugs, *i*, *i*, are fixed, and when the block is introduced into its place, a wedged plug, *j*, is driven in a vertical hole in the block, by which means the ends of the plugs, *i*, *i*, will be forced out beyond the sides of the block, and enter the grooves in the two blocks which come next to it, as is shown by dotted lines in fig. 5. I would remark, that although it is desirable to have the tongues, *c*, *c*, of one piece from side to side of the road, that is not absolutely necessary, as each tongue may be in several lengths; but in making a tongue in lengths, the ends should not come where the blocks, *a*, *a*, meet, but the ends of the tongues should both be received by the same block of wood, *a*, *a*.

Fig. 7, shows three views of inclined blocks separately, which are used in the paving or covering the roadway, fig. 3; and it should be stated, that although a particular angle is shown, the angle of inclination may be varied.

I will now describe the second part of my invention.

Fig. 8, shows a plan.

Fig. 9, a transverse section.

Fig. 10, a longitudinal section of my machine for cutting the grooves.

Fig. 11, shows one of the rotatory cutters employed for making grooves on the upper surfaces of blocks of wood used for paving roads, in order to obtain a good foot hold for horses. The machinery is so fitted up as to perform the two operations, though the parts, if preferred, may be put in separate framings, and constitute two machines. *k*, *k*, is the framing. *l*, is the axis, which receives motion by an endless strap driven by a steam-engine or other power acting on the drum, *m*, affixed to the axis, *l*, as is shown. *n*, is the rotatory cutter, which cuts the grooves to receive the tongues, *c*, *c*. This rotatory cutter consists of the frame, *n*, *n*, the nature of which is clearly shown in the drawing, it having the cutting blades, *o*, *o*, which form the sides of the grooves, and also the cutters, *p*, *p*, which remove the wood from

the grooves. *q*, is the rotatory cutter, which makes the grooves for the upper surfaces of the blocks of wood used in paving roads and such like surfaces. This rotatory cutter consists of the frame having the cutting blades, *r*, as is shown. A quick rotatory motion is given to these cutters, *n*, *q*, and blocks of wood are slided on the surfaces, *s*, *t*, through which the cutters respectively work, as is shown; *v* and *w*, being guage surfaces, which can be adjusted by the set screws, *x*, *x*, and thus enable a workman to cut the grooves in a succession of blocks, so as accurately to combine when tongues, *c*, *c*, are inserted in such grooves, and the workman can also form grooves in the upper surfaces of blocks of wood used for paving purposes, in such positions as he may desire. I would remark, that I do not make any claim to the parts of the machinery separately.

Having thus described the nature of my invention, and the manner in which the same is to be performed, I would have it understood, that what I claim is,

First, the mode of applying tongues and grooves to combine and sustain blocks of wood used in paving roads and such like ways: and,

Secondly, I claim the mode of combining rotatory cutters, *n*, *q*, with surfaces, *s*, *t*, and guage surfaces, *v*, *w*, suitably for forming grooves to receive tongues in blocks used for wood pavements, and for forming grooves on the upper surfaces of wood blocks used for paving roads, as above described.—In witness whereof, &c.

FREDERICK HARLOW.

Enrolled August 9, 1842.

Specification of the Patent granted to JOHN JEREMIAH RUBERY, *of Birmingham, in the County of Warwick, Umbrella and Parasol Furniture Manufacturer, for*

Improvements in the Manufacture of a certain part of Umbrella and Parasol Furniture.—Sealed January 13, 1842.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The invention relates to the making of that part of the furniture of an umbrella or a parasol which receives the ends of the whalebone or other ribs, and has them affixed therein by wire, as is well understood, such part of the furniture being sometimes called the top notches or wheel; and in constructing such part of the furniture of an umbrella or a parasol, it has heretofore been usual to cast the same in brass, and then to cut the notches and form the groove therein by hand. Now, the object of my invention is, to form such part of the furniture of an umbrella or of a parasol, out of sheet metal, by means of suitable dies: and in order that my invention may be most fully described and readily carried into effect, I will proceed to explain the drawing hereunto annexed.

Description of the Drawing.

Fig. 1, represents a circular disc of metal, which I prefer to be of charcoal iron, though other metal may be used. This circular disc is to be sunk in dies into the form shown by fig. 2; then to be further sunk into the form, fig. 3, by means of other dies. A similar disc of metal is also in like manner to be sunk by suitable dies, into the form shown in fig. 4; and the two parts, figures 3 and 4, are each to have the lower part of the metal punched out, as is shown at figures 5 and 6. I have not thought it necessary to show the dies and punches by which the metal discs used are brought into the shapes, figures 5 and 6, as they are formed by ordinary processes which are resorted to in sinking and punching metal for various purposes. The dies and punches employed being by preference used in fly presses; and it should be stated,

that in shaping sheet metal into this part of umbrella and parasol furniture, the metal is to be annealed from time to time, as is well understood when sinking metal for other purposes. The part, *a*, fig. 5, and the part, *b*, fig. 6, are next to have the notches formed around the projecting parts, a^1, b^1; and in order to accomplish this process, the die and punch, figures 7, 8, and 9, are used.

Fig. 7, shows the upper die or punch, and two side sections of the lower die.

Fig. 8, shows a plan of the lower die; and

Fig. 9, shows the under side view of the upper die or punch. The part, *a*, fig. 5, is first introduced into the lower die, fig. 7, and the punch is caused to descend, which will cut out the required notches; then the part, *b*, is placed in the die, fig. 7, and the punch again caused to descend, which will cut out corresponding notches in the projecting edge, b^1, of the part, *b*; and the tubular part *b*, will be forced into the tubular part, *a*, and in this state they will be forced out of the die, fig. 7, by the punch, fig. 7, and the combined parts will assume the character of a top notch or wheel, as is shown at fig. 10. The parts, *a* and *b*, being thus formed and combined, are next to be taken hold of by means of the pliers, fig. 11, the chaps of which are made of the thickness of the distance the projecting edges, a^1, b^1, should be apart; therefore the chaps, *c*, *c*, enter between the groove formed between the parts, a^1, b^1, and in this condition the parts are introduced into the die, fig. 12, and receive pressure by the upper die or punch, fig. 13; and there is to be a cylindrical punch forced through the interior of the top notch or wheel thus formed, in order to make all the tubular parts of the same size or diameter, by which means, and by their being pressed into the die, fig. 12, the two tubular parts, *a*, *b*, will be securely held together, and thus form a complete top notch or wheel for an umbrella or parasol, according to the size made; the rough edges

of the lower part of the tubular part being removed by a file or other instrument.

Having thus described the nature of my invention, and the manner in which the same is to be performed, I would remark, that I make no claim to the sinking or punching of metal when not employed for the purpose of making that part of umbrella and parasol furniture called a top notch or wheel. And I would have it understood, that what I claim is, the mode of manufacturing that part of umbrella or parasol furniture called a top notch or wheel, by forming the same out of sheet metal, by suitable dies, as above described.—In witness whereof, &c.

JOHN JEREMIAH RUBERY.

Enrolled July 13, 1842.

Specification of the Patent granted to JOHN BEVAN, *of No.* 15, *Whitehead's-grove, Chelsea, in the County of Middlesex, Gentleman, for an Improved Mode of Expelling the Air from certain Cases or Vessels used for the Preservation of various Articles of Food.*—Sealed April 6, 1842.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—I do hereby declare the nature of my said invention to consist in expelling the air from cases in which various articles of food are placed for preservation, by connecting the said cases with a vacuum chamber or other exhausting apparatus on the one hand, and with a vessel containing gelatine or other suitable material or materials in a fluid state on the other hand, in such manner that by opening the communications, the air escapes into the exhausting apparatus; while the gelatine succeeds to supply its place. And in further compliance with the

said proviso, I do hereby describe the manner in which my said invention is to be performed, by the following statement thereof, reference being had to the drawing annexed, and to the letters marked thereon (that is to say) :—

And first I would premise, that so far as I am informed on the subject up to the time of granting my said letters patent, by the then methods in use, it was considered essentially necessary to drive the atmospheric air out of such cases or vessels by the application of external heat at a very high temperature, and a patent was obtained for the use of a bath, wherein by the use of chemical mixtures a heat was obtained so high as 280° Fahrenheit, and this high temperature it was shown was essentially necessary, for the preservation of animal substances, to maintain for a considerable length of time, to the great detriment of the articles of food exposed to the said high temperature, which my said invention not only renders unnecessary, but procures for me the power of cooking the articles of food at a very low temperature, by enabling me to cook them in almost a perfect vacuum.

Description of the Drawing.

A, is a vessel open at the top and filled to the line, *i*, with gelatine in a fluid state, having a pipe, *j*, and a stopcock, *e*, firmly attached to it. B, is a sphere of metal wherein a vacuum is obtained when required by the condensation of the steam therein (the jet of water at *m*, performing this office), having the pipe, *j*, and stopcock, *f*, firmly and securely attached to it. The stopcock, *k*, is for the passage of steam previous to the condensation of the steam in vessel, B, and the pipe and stopcock, *l*, is for the admission of steam into the sphere or vessel, B. I first place the substance to be preserved in the vessel, C, of tin of a cylindrical or other convenient form, and having by soldering closed it therein, I attach to the case two small metal tubes or pipes, *d*, and *c*, by firmly solder-

ing them to the case, as shown at *a*, and *b*. These pipes or tubes are then attached by soldering or other convenient means to the ends of the pipes, *j*, and *j*, at the points, *h*, and *h*. Having now the substance to be preserved enclosed in the air-tight vessel or case, C, with communications where required by means of the tubes, *c*, and *d*, with the vessels, A, and B, I place the case in the bath of water, N, at a temperature of 120° Fahrenheit, or thereabouts, and by turning the cock, *f*, open the communication with the sphere or vacuum chamber, B, the air in the case, C, becomes exceedingly rarified, and the temperature of 120°, or thereabouts, is sufficient to cook and throw off the fixed air contained in the animal or vegetable substance enclosed therein. Having maintained this temperature for a short time, say about fifteen minutes for a fowl, I turn the cock, *e*, and opening the communication with the gelatine contained in the vessel, A, which is kept in a warm fluid state by being in the warm bath, P, the atmospheric or any other convenient pressure on the surface of the gelatinous or other suitable fluid forces it through the pipe, *j*, and tube *c*, into the case, C; the pressure of this fluid expels the small remainder of rarified air contained in the case, C, through the tube, *d*, and pipe, *j*, into the exhausted or vacuum chamber or vessel, B. I then hermetically close the case, C, by cutting and pressing, or nipping the tubes, *d*, and *c*, at the points, *g*, *g*. I then submit the case for a few minutes to boiling water according to its size, if for a fowl, say thirty minutes, and then allow it to cool when the process is complete.

Having thus described my mode of expelling the air, I hereby claim as my invention the use of an exhausted or vacuum chamber, for the purpose of expelling the air in cases used for the preservation of animal and vegetable substances to be used as articles of food, and where the articles are such as will admit of it, the introduction of gelatine or other like substance into the said cases, as

previously described. And such my invention being to the best of my knowledge and belief entirely new, and never before used within that part of Her said Majesty's United Kingdom of Great Britain and Ireland called England, Her said dominion of Wales, or town of Berwick-upon-Tweed, nor the said Islands of Jersey, Guernsey, Alderney, Sark and Man, nor in any of the said colonies or plantations abroad, I do hereby declare this to be my specification of the same, and that I do verily believe this my said specification doth comply in all respects fully and without reserve or disguise with the proviso in the said hereinbefore in part recited letters patent contained. Wherefore I do hereby claim to maintain exclusive right and privilege to my said invention.—In witness whereof, &c.

JOHN BEVAN.

Enrolled October 6, 1842.

Specification of the Patent granted to JAMES BOYDELL, *Junior, of the Oak Farm Works, near Dudley, in the County of Stafford, Iron Master, for Improvements in the Manufacture of Keel-plates for Vessels, Iron Gates, Gate-posts, Fencing, and Gratings.*—Sealed May 24, 1842.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention relates, First, to a mode of making the keel-plates for vessels, by rolling iron into the proper form in place of forming such keel-plates by bending iron plates by hammering.

Secondly, my invention relates to a mode of making iron gates, iron fencing, and iron gratings, by welding a series of bars together by rolling; and,

Thirdly, my invention relates to a mode of making the

feet of posts for gates and for fences, by moulding or forming an enlargement or block of the scoria or fluid-cinder of iron-works on the end of each iron post, whether for a gate-post or for a fence. And in order that my invention may be fully understood and readily carried into effect, I will proceed to explain the means pursued by me. In the manufacture of keel-plates used in the construction of vessels of iron, it has been usual to bend iron plates into the desired form by hammering when the plate is in a heated state, which is an expensive means of making such keel-plates. Now the object of the first part of my improvements is to form such keel-plates by rolling, by which means I am enabled to obtain better and cheaper keel-plates.

Fig. 1, represents the section of a keel-plate, which I prefer to make of three pieces of iron, as I am thereby enabled to put a greater thickness of metal at the angles than results when using a single plate of uniform thickness.

Fig. 2, shows the section of two portions of angle iron, which I first produce by rolling, as is well understood.

Fig. 3, shows the section of a plate of iron, which I use for producing the bottom plate of a keel-plate for a vessel, and I make the plates, figures 2, and 3, about sèven to nine feet long, that being a convenient length, but such length may be varied if desired.

Fig. 4, shows the plates, *a*, *b*, *c*, of figures 2, and 3, combined or clamped together by wood cramps, *d*. In this state the iron is put into a proper furnace to be heated to a welding heat, by which the wood cramps will be burned but the edges of the iron will run together sufficiently to allow of the combined parts being withdrawn from the furnace, and passed between rollers properly formed to roll the iron keel-plates into the shape required, whereby the shape desired will not only be obtained, but the parts will be securely welded, and I prefer that the iron shall pass between three or more pair

of rolls, the spaces between which being slightly less and less in order to elongate the iron keel-plate and securely weld the parts together; I would remark, that although I consider it better to form each keel-plate of three pieces combined by welding, as above explained, yet the simple shaping keel-plates by means of rollers, will be found a superior mode of producing them than by bending by hammering by hand, as heretofore practised. In case of sinking iron-plates by rollers into the required form for keel plates, it will be desirable to pass the plate more than three times between rollers, gradually sinking the trough till it is of the depth required, and the projecting edges, *a*, *b*, are of the size desired.

I will now describe the second part of my invention, which relates to placing several bars of iron together into the form of a gate, or of part of a fence, or of a grating, and when heated to a welding heat, to pass them together between rollers, such as are commonly used for making iron plates; thus supposing I wish to make a light iron gate, I place several bars one on the other and bind them together with wire or use wood clamps, so as to retain the various bars correct whilst being heated in a proper furnace to a good welding heat, which will cause the surfaces to run together sufficiently to allow the combined bars to be drawn from the furnace on to a truck or platform on wheels, and thereby to be conducted up to the rollers and entered between them.

Fig. 5, shows a series of bars placed together suitable for making a gate, or a portion of a fence, and in like manner a series of bars will be combined when making a grating. *e*, *e*, are the bars which are to be upright, and *f*, *f*, are horizontal bars, which are to be held together by wire or by wood cramps or other convenient means, and when the whole is at a welding heat the combined bars are to be carefully introduced between the rollers, and the pressure thereby given will securely weld all parts together, and the gate or part of a fence, or the grating

will be elongated in the direction in which it passes between the rollers. In this manner very light and useful iron-gates, fencing, and gratings may be made.

I will now describe the third part of my invention, which relates to forming or moulding a block or enlarged foot on to the ends of iron bars to be used as posts for gates, or for fencing. For this purpose I form a mould or case of thin sheet-iron, of the size I desire to have the foot of a post, such as is shown in section at figure 6, and I place the iron bar which is intended for a post into this case and secure it in a perpendicular position, and then pour in the liquid scoria or cinder of iron-works; that which I generally use is what is tapped from blast furnaces, though the liquid-cinder from other furnaces may be used; by this means an iron post will have an enlarged foot securely formed, which will retain the post secure when the foot is placed in the ground. On the upper surface of the scoria I sometimes place a cover or plate with turned down edges, as is shown at figure 7, at *g*.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the precise details, provided the peculiar character of either part of my improvements be retained. But what I claim is,

First, the mode of manufacturing keel-plates for vessels by rolling iron into the proper form, as above described,

Secondly, I claim the mode of making gates, fencing, and gratings, by welding bars by rolling in the manner above described; and,

Thirdly, I claim the mode of applying feet to iron-posts for gates and for fences, by casting or forming thereon scoria or cinder of iron-works, as above described.—In witness whereof, &c. JAMES BOYDELL, JUN.

Enrolled October 26, 1842.

Specification of the Patent granted to JEAN GEORGE SUE CLARKE, *of Euston-grove, in the County of Middlesex, Engineer, for Improvements in Supplying and Regulating Air to the Furnaces of Locomotive Engines.*— Sealed April 6, 1842.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— My invention relates to the application of apparatus for heating and regulating the air supplied to the furnaces of locomotive engines, and in such manner that the apparatus may be moved out of the way when it is desired to remove the fire or for other purposes. And in order that the invention may be most fully understood, and readily carried into effect, I will proceed to describe the drawings hereunto annexed, in which the same letters of reference are used to indicate similar parts wherever they occur.

Description of the Drawings.

Fig. 1, shows a longitudinal section of as much of a locomotive steam-engine boiler and fire-box as will be necessary to explain the nature of my invention.

Fig. 2, is a transverse section of the same parts taken at the dotted line, A, B, in figure 1; and,

Figs. 3, and 4, show similar sections to figures 1, and 2, the only difference being that the apparatus for supplying and regulating the air to the furnace is shown to be inclined downwards, so as to allow of the fire-bars being got at to remove the fire or for other purposes, the objects of the invention being, First, to supply heated air heated in suitable apparatus placed below the fire-bars of the furnace. And,

Secondly, to regulate such supply it will not be necessary to enter into any description of the construction of locomotive steam-engine boiler furnaces. I shall therefore

confine my description to the apparatus applied below the fire-bars for heating and regulating the supply of air to a furnace. The apparatus consists of means of causing the supply of air to pass in contact with an extended surface of metal heated by being placed below the fire-bars of the furnace, and although the construction of this apparatus may be varied without departing from my invention, so long as it is placed below the fire-bars and offers sufficient surface for heating the air, yet I believe the apparatus shown in the drawings will be found best suited for the purpose. Below the furnace is placed an axle, *a*, which is carried by and moves in bearings, *b*, *b*, affixed to the sides of the boiler. On this axis is affixed two arms, *c*, *c*, which have slots formed in their outer ends to receive pins, *d*, affixed under the apparatus hereafter explained, and these arms, *c*, are for the purpose of raising and lowering the back end of the apparatus for heating and regulating the supply of air, the front end of the apparatus being hinged to the lower part of the boiler or fire-box, as is shown in the drawings. *e*, is an arm affixed to the axis, *a*, to which is attached the connecting-rod, *f*; by means of a pin-joint, this rod at its upper end being forked, carries the axis of a screw-socket, *g*, such screw-socket having the screw, *h*, passing through it. The screw, *h*, turns in bearings at *i*, *i*, and on the upper end thereof is a cog-wheel, *j*, affixed, which is driven by means of the pinion and handle, *k*, as will readily be understood on examining the drawings. The apparatus for heating and regulating the air as it is supplied to the furnace consists of two compartments, *l*, and *m*. The air passes in at the opening, l^1, and thence under the surface, *l*, which is heated by the fire above, and by such means the air becomes highly heated, the air then passes down under the partition, l^2, and enters into the compartment, *m*, from whence it passes laterally into the ash-pit; and in order to regulate the supply there is a valve applied at *n*, capable of covering the opening, l^1,

such valve being capable of being kept more or less open by the connecting-rod, *o*, which is connected by a pin-joint at one end to an arm affixed to the valve at *p*, and at the other end the connecting-rod is attached to the bell-crank, *q*, as is shown. *r*, is a rod having at its upper end a handle, by which it can be raised or lowered, and notches by which it can be supported at any desired position, and at its lower end it is attached by a pin-joint to the bell-crank, *q*. By this means the engineer can regulate the supply of air to his furnace.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that what I claim is,

First, the mode of supplying heated air to the furnaces of locomotive engines by applying apparatus below the fire-bars, as above described; and,

Secondly, I claim the mode of regulating the supply of air to such apparatus, as above described.—In witness whereof, &c.

JEAN GEORGE SUE CLARKE.

Enrolled October 6, 1842.

Specification of the Patent granted to GOTTLIEB BOCCIUS, *of New-road, Shepherd's-bush, in the County of Middlesex, Gentleman, for Improvements in Gas, and on the Methods in Use, or Burners for the Combustion of Gas.*—Sealed January 27, 1842.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention in respect of the improvements in the combustion of gas as adapted to the purposes of illumination, consists in applying above the surface or jet-holes of the burners two or more concentric chimneys or cylinders, in addition to and within the usual chimney of glass,

according to the arrangement and position of parts or combination of apparatus shown in figures 1, 2, 3, 4, 5, 6, sheet 1, and in figures 7, 8, sheet 2, of the drawings. The same letters refer to similar parts in each figure.

Fig. 1, is an elevation part in section of a complete single ring burner of one inch diameter.

Figs. 2, 3, 4, exhibit a complete single ring burner of two inches and a quarter diameter in plan elevation and section.

Figs. 5, and 6, show in plan and elevation a double concentric ring burner two inches and a-half diameter; and,

Figs. 7, 8, a treble concentric ring burner of seven inches diameter; so far as regards the arrangement of the rings and the introduction of the gas to them, the diameter here spoken of being the diameter of the circle passing through the centres of the holes or orifices in the ring. The internal concentric chimneys or cylinders are marked by the letters, *c*, *c*, *d*, *d*, figures 1, 2, 3, 4, surrounded by the glass chimney, *e*, *e*. The internal chimneys are connected together and kept at the proper distance from each other by rivets or other convenient means; they rest upon the supports, *f*, *f*, and the glass chimney upon the supports, *g*, *g*, the chimneys for burners having two, three, or more rings combined are similarly applied and supported. The material which I employ for the body of the burner is iron, brass, copper, or other suitable metal, but for the upper surface through which the jet-holes are pierced, I use thin German silver soldered into it. I prefer the latter metal for the perforated surface of the ring and have found it very proper for the purpose, and very durable on account of the high temperature required for its fusion. I generally form the central chimney, *c*, of thin sheet-iron as a cheap and durable material, but glass or any other metal or substance, whether transparent or opaque, capable of withstanding the heat, will answer the end. The same remarks apply to the material

of the chimney, *d*. When metallic central chimneys are used it is not necessary that the whole of the external chimney, *c*, should be of glass. In burners of a large size it may be more economical to have a glass rising above the ring only to the height of the lower edge of the internal chimneys. In such cases the upper part of the external chimney may be of metal and be connected with the two internal chimneys, and in situations where my invention can be placed within a glass lanthorn, as in the streets, the glass chimney may, without any material loss of effect, be altogether dispensed with, leaving the three concentric chimneys just described suspended above the ring. With respect to the dimensions of the chimneys, I have found that in single ring burners the diameter of the innermost chimney should not be much greater or less than the diameter of the burner as above defined, and that the diameter of the second chimney should not be much greater or less than the external diameter of the ring of the burner, when the ring is of the proportions shown in the drawing, and I make the space between the exterior glass chimney, *c*, and the chimney, *d*, equal to the space between *d*, and *e*, but this chimney should be enlarged at its lower end, as is shown in the drawings. The height of the chimneys, *c*, and *d*, is well proportioned when equal to double the diameter of *d*. The distance at which these chimneys are fixed above the surface of the jet-holes, may be greater in small than in large burners. I have found the lamps act perfectly well when this distance is equal to the diameter of the flame at the orifice of the holes, as shown in fig. 4, but in small burners I have found that the length of the flame may be beneficially increased, and I have shown the extreme length which I recommend in the lamp represented in figure 1. In burners consisting of two or more rings, these dimensions have reference to the diameter of the outermost or largest ring and flame. As a general rule for the diameter of the innermost chimney and also for

the length of flame, it must be such that all the flames shall enter that chimney, which they will do if the chimney be made of the prescribed proportions. In constructing burners of two or more concentric rings, I place the inner ring at a certain height above the outer one or that next to it, as shown in the double and triple ring burners, figures 6, and 8; the object of this arrangement, which I consider to be a great improvement on burners of the same kind heretofore made, is to provide for the greater equality of the height of the several cylinders of flame in such burners, so that they shall terminate as exactly as possible at one and the same level, and all enter the central chimney together. I find by this arrangement that the economy or luminous effect arising from the combustion of a given quantity of gas is much increased, an effect which I attribute in great measure to the circumstance that nearly equal luminosity is obtained in the flames from each ring at equal heights above the surface of the greater or external ring, I have found that the height of the surface of one of these concentric rings above another should be a little more than the depth of the ring, as shown in figures 6, and 8. In order to provide for a more equable distribution of gas to these burners, the junction between the rings is so arranged that the gas first enters the largest ring from the service-pipe, *b*, through the pipes, *h*, *h*, *h*, figures 7, and 8, thence passes into the second ring through the pipes, *i*, *i*, *i*, and lastly into the innermost ring through the pipes, *k*, *k*, *k*. In order still further to equalize the height of the flames, and to produce an uniform luminosity in the several flames, I find it requisite to make the jet-holes of the inner rings somewhat larger than those in the outermost ring. A similar arrangement is shown in figures 5, and 6, for the introduction and distribution of the gas in the double ring burner. The perforations or jet-holes, which I find to give the best results, are very small in a burner of one inch diameter. I find it ad-

visable to have from sixty to sixty-five very small holes, in order to pass about three cubic feet of gas per hour, whereas the common argand gas-burner has usually from twelve to fifteen holes of a larger bore to give equal light, when consuming a much larger quantity of gas. With respect to the number of the perforations for the escape of the gas in the larger burners, I drill the holes at a distance from each other of about one-twentieth of an inch. As a general rule for the combustion of gas according to my improvements it is necessary to observe, that the quantity of gas supplied, or height of the flame, should be such that its top is just received within the lower edge of the innermost central chimney. When this is the case, the combustion will be found very perfect and the light brilliantly white; no carbon will be deposited within any of the chimneys, and the light will be perfectly steady, the lower edge of the central chimneys defining the upper part of the light, so that the jagged or irregular edges and flickering, so unpleasant to the eye in common gas-burners, does not exist, and the light appears of a permanent form as a truncated section of a luminous cone. Although I have stated the nature of the materials with which I prefer to construct the several parts of the burners and chimneys, as well as the proportions of the several parts thereof, I do not mean to confine myself to the use of these particular materials and proportions. I do not mean to assert that these materials and proportions of parts may not be varied, but being desirous of giving all the information in my power, I have assigned such rules and directions for the construction, arrangement, and management of the parts and apparatus as will, according to my experience, be highly advantageous in the combustion of gas. And although a circular form of flame alone has been mentioned and represented, the same improvements in the combustion of gas will be attained, if a form of flame bounded by straight lines or other form than circular be employed, provided a corre-

sponding change be made in the form of the chimneys and apparatus.

Having thus described the nature of my said invention, and in what manner the same is to be and may be performed, I wish it to be understood that I lay no claim to the exclusive use of any of the parts or apparatus above described, except so far as they are used in connexion with or furtherance of my said invention, which I declare to consist in the particular combination, position, and arrangement of the several parts or apparatus hereinbefore described for the combustion of gas.—In witness whereof, &c.

Enrolled July 27, 1842.

DISCLAIMER

Entered by the said Gottlieb Boccius with the Clerk of the Patents of England, pursuant to the statute passed in the session of Parliament held in the 5th and 6th years of the reign of his late Majesty King William the Fourth, entitled, "An Act to amend the law touching Letters Patent for Inventions:"—

I, the said Gottlieb Boccius, do hereby disclaim the following part of the title of my said invention, that is to say, I disclaim the words, "in gas, and on the methods in use, or burners," so that the title of my invention, the said words being so disclaimed as aforesaid, will be as follows,—"Certain improvements in the combustion of gas."—In witness whereof, &c.

GOTTLIEB BOCCIUS.

Enrolled July 29, 1842.

Specification of the Patent granted to ANTOINE MERTENS, *of the London Coffee House, in the City of London, Publisher, for Improvements in the Manufacture of Plaited Fabrics.*—(Communicated by a foreigner residing abroad.)—Sealed December 16, 1841.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The invention relates to a mode of manufacturing plaited fabrics by means of strands or threads of India-rubber, used at distant intervals, worked into the fabric when being produced into a loom, such India-rubber threads acting as the warp or the weft, as hereafter explained: and it should be stated, that the fabrics may be woven of silk, cotton, wool, flax, or other fibres; or the fabrics which are to be plaited by the India-rubber strands produced therein, may be woven of mixtures of yarns of two or more different fibres, according to the judgment of the manufacturer,—the invention not relating to the materials of which the woven plaited fabrics may be composed, so long as they are plaited by the contracting properties of India-rubber strands introduced at intervals when weaving the fabrics. It should be stated, that I am aware that in manufacturing elastic fabrics by weaving, it has been common in some cases to compose the warp partly of strands of India-rubber, and partly of non-elastic yarn of cotton, silk, wool, or other yarn, or mixtures thereof. I wish it, therefore, to be understood, that the invention secured under the present letters patent, is strictly confined to the use of India-rubber, at such intervals in the fabric woven of other yarn, that the fabric produced by such other yarn shall be of a width to form complete plaitings or folds. In order that the invention may be most fully understood and readily carried into effect, I will proceed to give some examples of the

means of manufacturing plaited fabrics according to the improvements.

Description of the Drawing.

Fig. 1, represents a portion of fabric which is manufactured according to my improvements, the weaving being performed when the India-rubber strands or yarns are in the extended and non-elastic state, and they may be used in the covered or uncovered state produced by braiding or by winding round the surface of each strand, yarn of silk, or other fibre, as is well understood; but when uncovered India-rubber threads or strands are used, the weaver should cover the strands of India-rubber in the act of weaving, as is well understood and practised heretofore. The fabric, fig. 1, has several strands of India-rubber introduced into the warp at the parts, *a*, *b*, *c*, of the fabric, as is indicated by the dotted lines; and it will be evident, that when the India-rubber strands are elasticated, the fabric between *a* and *b*, and *b* and *c*, will be brought into plaits, as is indicated at fig. 2; and it will be evident that the spaces of fabric between the points, *a*, *b*, and *b*, *c*, must have width sufficient to produce folds, and therefore the width of the fabric between those parts where the India-rubber threads are introduced, should never be less than one-eighth of an inch. The extent, however, of the fabric between the points where the India-rubber strands are introduced, may be varied according to the effect desired to be obtained. Thus fabrics for frills may be made by weaving the fabric as is shown at fig. 3, where the India-rubber is introduced at only one selvage, the consequence will be, that when the India-rubber threads or yarns are rendered elastic by heat, as is well-understood, the fabric will be plaited into the form shown in fig. 4. In some cases, in place of producing the interweaving of the India-rubber threads, by placing them in the warp, I produce fabrics by the ordinary weaving, and at intervals I introduce India-

rubber threads or yarn as weft, for a short or longer length of weaving; so that when the India-rubber strands or threads are contracted by heat, the intervals of fabric between the places where India-rubber is introduced, will be drawn up into plaits; and in some cases I apply India-rubber in the warp, and also in the weft, leaving square intervals of fabric where there is no India-rubber; the consequence of which will be, that the fabric will be plaited in squares. In weaving the fabrics they may be plain or ornamental, and may be produced in one or more colours, as fabrics have heretofore been made. The invention, as above stated, not being any improvement in the act of weaving the fabrics which are to be plaited by having India-rubber introduced at distant intervals, in order to produce such fabrics in a plaited form.

Having thus described the nature of the invention, and the manner of performing the same, I would have it understood, that I make no claim to the weaving of fabrics of wool, cotton, silk, flax, or other fibrous matters, when separately considered; nor do I claim generally the weaving fabrics with India-rubber threads separately, nor when combined in the same fabric with non-elastic yarns or threads, so long as the non-elastic threads of the warp and weft are not so combined as to produce a fabric suitable to be plaited by the India-rubber threads or yarns introduced at distant intervals. And I wish it to be understood, that what I claim is, the mode of manufacturing plaited fabrics by causing India-rubber strands or yarns to be interwoven at distant intervals in the fabrics, and in such manner that the fabric will become plaited when the elasticity is restored to the India-rubber by heat.—In witness whereof, &c.

ANTOINE MERTENS.

Enrolled June 16, 1842.

Specification of the Patent granted to ACHILLE ELIE JOSEPH SOULAS, *of George-yard, Lombard-street, in the City of London, Merchant, for Improvements in Apparatus for Regulating the Flow of Fluids.*—(Communicated by a foreigner residing abroad.)—Sealed March 22, 1841.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The invention relates to modes of regulating the flow of fluids, and especially that of gas, for the purpose of lighting or conveying a light. The flow of gas may be regulated by the means afterwards described.

The first mode is composed of a disc placed within a cylinder, leaving a space for the passage of the gas. This space, and the weight of the disc, are so regulated that the disc rises when the pressure exceeds the one required. In the centre of this disc is fixed a rod, which, rising therewith, renders narrower the orifice through which the gas passes, in proportion to its height, so that the opening being in an inverse ratio to the pressure, an equilibrium is established, and the flow becomes uniform or regular. Several modes of rendering the opening narrower may be adopted. Thus the rod may be of a conical form, and move in a circular ring, as shown at fig. 1; or it may be terminated by a small disc moving in a conical canal. (See Fig. 2.) This canal may also be cylindrical, closed at its basis, and allowing the gas to penetrate by lateral openings, the height of which diminishes in proportion to the elevation of the small disc. If too great a pressure upon the small disc were apprehended, a chain might be suspended over the large disc in order to increase its weight, in proportion as it rises, as shown at fig. 3.—In witness whereof, &c.

ACHILLE ELIE JOSEPH SOULAS.

Enrolled September 22, 1841.

Specification of the Patent granted to* James Clement, *of Liverpool, for Improvements in Composition for Ornamenting Glass and Picture Frames, and Articles for Interior and other Decorations; also for the Manufacture of Toys and other Fancy Articles.—Sealed March 4, 1842.

To all to whom these presents shall come, &c., &c.—My invention relates to the application of paste produced from potatoes, in combination with other suitable materials, for moulding or forming picture-frames and articles for interior or other decorations; also for the manufacture of toys and other fancy articles. And in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

In preparing the potatoes, they are to be cooked as if intended for the table, either by boiling, steaming, or roasting. They are then to be bruised and mixed with some pulverized article, such as fine sawdust, turf, or the waste bark from a tan-yard, ground very fine, or any other fine powder which can be had at small cost, the whole being worked into a fine paste by rolling and beating. It is then fit for use, and may be cast into ornaments by the aid of moulds, such as are commonly used for casting picture-frames and other ornaments, and applied in the same manner.

Having thus described my improvements, and the best manner I am acquainted with for performing the same, I would remark, that although I have spoken of sawdust, turf, and bark, as the materials used for making the above-named composition, I have done so because I believe they are the cheapest, lightest in weight, and most suitable for the purpose; but I do not confine myself thereto, as other articles in a pulverized state would answer the same purpose.

I would also have it understood, that my invention does not depend on the materials employed in combination with potatoes, the object of the patent being to apply the pulp or paste of potatoes in combination with suitable powdered materials, to produce a composition to be formed or moulded into the shapes desired, for the purposes above mentioned.—In witness whereof, &c.

JAMES CLEMENTS.

Enrolled September 4, 1842.

Specification of the Patent granted to ALFRED JEFFERY, *of Lloyd's-street, Pentonville, in the County of Middlesex, Gentleman, for a New Method of Preparing Masts, Spars, and other Wood, for Ship Building and other Purposes.*—Sealed April 15, 1842.

To all to whom these presents shall come, &c., &c.—The nature of my invention consists in a new method of preparing masts, spars and other wood, for ship building and other purposes, by the application or use of a composition or glue which is insoluble in water, and more elastic than glue in ordinary use. The composition or glue which I use I designate a vegetable glue, and I call it Jeffery's marine glue, or my marine glue, and I prefer to make it with a proportion of caoutchouc; but I make it without using any caoutchouc, or with a less proportion of that article where it is to be applied in situations exposed to great atmospheric action, in which cases the caoutchouc would have a tendency to contract.

To make my said marine glue with caoutchouc, I use a solution which I call my crude naptha caoutchouc solution; and to make this solution, I mix caoutchouc of good quality (giving the preference to East India caoutchouc) with coal naptha, commonly called crude or rough naptha, in the proportion of one pound of the caoutchouc to four gallons of the naptha. I cut the caoutchouc into

thin shreds before I use it, and I stir the mixture of caoutchouc and naptha occasionally, by any convenient means, until the caoutchouc is so dissolved as to bring the mixture to a thickness about the same as thick cream. I generally find that the caoutchouc is sufficiently dissolved in about ten or twelve days. To proceed to make this glue, I then take one part, by weight, of my said crude naptha caoutchouc solution, and two parts, by weight, of gum lac or shell lac; but I give the preference to shell lac. I put these into an iron vessel, having a tap in the lower part to provide for drawing off the glue, as hereinafter mentioned, and I heat this vessel for the amalgamation of the said materials. Hot water, steam, or fire may be applied in any convenient manner for the purpose of heating the vessel; but if fire is applied, care should be taken to avoid the mixture being brought in contact with it. During the application of heat to the vessel, I stir the mixture occasionally, and I continue to apply heat until the solution and the lac are thoroughly amalgamated. This mixture is my marine glue, made with caoutchouc. I draw it from the vessel in which it has been made, whilst heated, as aforesaid, through the tap provided for that purpose, and pour it upon slabs to cool it; and when it has been cooled, it may be cut into pieces for use. To make my said marine glue without caoutchouc, I mix one part, by weight, of coal naptha, called crude or rough naptha, as aforesaid, and two parts, by weight, of gum lac or shell lac (giving the preference to shell lac), and I proceed with these ingredients in the same manner as hereinbefore mentioned, in respect to the process when I use caoutchouc, substituting only the coal naptha for the before-mentioned solution, and thus make my marine glue without caoutchouc.

I have stated the proportions in which I use the ingredients which I have described in making my said marine glue; but these proportions may be varied, and a larger proportion of lac may be used to produce greater

hardness in the glue, or where the article or material to be prepared is to be exposed to great atmospheric action, or a larger proportion of the caoutchouc solution where the glue is made with caoutchouc or of the naptha (where made without caoutchouc), to produce greater softness or elasticity. I use my marine glue to prepare masts, and spars, and other wood, for ship building and other purposes, by applying it to fix or join together the parts of masts, or spars, or other pieces of wood, and also to make good such defective pieces of wood as are commonly called shakey pieces. When I use it for any of these purposes, I put it into an iron vessel, and heat it (by applying fire to the vessel) to a temperature about 250° of Fahrenheit, and I apply it whilst it is thus heated. In applying my marine glue to fix or join together the parts of masts, or spars, or other pieces of wood, I spread it as even as possible, by means of a stiff brush, upon the surfaces which I propose to fix or join together, but care should be taken that the surfaces are dry when the glue is applied to them, and they must be completely coated or covered with the glue. After the surfaces have been thus coated or covered, they must be joined or put together, and pressed together, by any convenient means; but it will be found that the temperature of the glue is reduced very quickly after being spread upon the surfaces; and if the temperature be reduced so that the glue becomes stiff, the glue must be warmed again by applying a heat of about 140° Fahrenheit, until it becomes soft and liquified. This may be done by applying hot irons, or by any other convenient means; and whilst the glue is in this soft or liquified state, the masts, spars, or other pieces of wood are to be joined or put together and pressed, as above pointed out in the first instance, and the parts or pieces of wood may then be wedged or bolted together in any ordinary manner, as may be required. If the surfaces which are to be fixed or joined together are even, I prefer a thin coating of the

glue to each surface, but if any such surface contain inequalities, then its coating must be sufficiently thick to fill up the cavities and to leave an even surface of glue. In applying my marine glue to make good such defective pieces of wood as are commonly called shakey pieces, I fill up the crevices with the glue whilst it is at a temperature of about 250° of Fahrenheit, by pouring it into them or by any other convenient means. I have described the materials with which I make my said marine glue, and the proportions in which I use such materials; but any glues having the properties of being insoluble in water, and more elastic than the glue in ordinary use, might be applied, or the same materials may be used in other proportions than I mention; and therefore I do not claim the use of these particular materials or any particular proportions. But I claim as my invention the use or application in preparing masts, spars, and other wood, for ship building and other purposes, of glue insoluble in water, and more elastic than the glue in ordinary use.—In witness whereof, &c.

ALFRED JEFFERY.

Enrolled October 15, 1842.

Specification of the Patent granted to WILLIAM HENRY FOX TALBOT, *of Lacock Abbey, in the County of Wilts, Esq., for Improvements in Coating or Covering Metals with other Metals, and in Colouring Metallic Surfaces.* —Sealed December 9, 1841.

To all to whom these presents shall come, &c., &c.—The first part of my invention consists of adding gallic acid to the metallic solution intended to be precipitated. I take any convenient solution of silver, gold, or platina, and I add to each of them a solution of gallic acid in water, ether, or alcohol, which latter I consider preferable. Into any one of these mixtures I then immerse a

clean bright plate of metal until it becomes coated (as the case may be), with silver, gold, or platina. I find it best in general to begin with a weak or dilute solution, and afterwards to use a stronger one. The gallic acid need not be pure, but cheaper liquids, containing a considerable portion of it or of an analogous vegetable substance, may be used instead of the pure acid. With respect to this part of my invention, I claim the use of gallic acid or liquids containing it or an analogous vegetable substance for facilitating the precipitation of metals upon other metallic surfaces and coating them therewith. The next part of my invention is a method of silvering metallic surfaces. For this purpose I dissolve freshly precipitated chloride of silver in hypo-sulphate of soda or any other liquid hypo-sulphate, which I believe to be the only class of bodies hitherto discovered which have the property of dissolving chloride of silver freely and abundantly. Into this solution I then immerse a clean bright plate of metal, and it is very rapidly coated with a bright silver coating. In order to obtain thicker coats of metal I employ a galvanic battery in the way now well known, using one of the liquids described in the first and second parts of this specification, and employing for one of the poles or electrodes a piece of metal of the same kind as that which is intended to be precipitated. With respect to this part of my invention I claim the use of hypo-sulphate of soda or other liquid hypo-sulphate for the silvering of metals, and the employing a galvanic battery for obtaining thicker deposits of silver, gold, or platina; but I claim this only when used in conjunction with one of the liquids above described. The metals which may be coated with other metals by the processes above described are brass, copper, German silver, and also (though less effectually) iron and steel.

The next part of my invention is a method of ornamenting surfaces of brass or copper, by first gilding them partially according to some pattern, and then washing

them over with a solution of chloride of platina, which has no action on the gilt parts, but gives a dead black appearance to the rest of the surface, thus enhancing the brilliancy of the parts which are gilt.

The last part of my invention is a method of colouring polished surfaces of copper, by exposing them to the vapour of sulphuretted hydrogen, or of any of the liquid hydro-sulphurets, or to the vapours of sulphur, iodine, bromine, or chlorine, or by dipping the metal into liquids containing them, but I prefer to use the hydro-sulphurets as above mentioned. By this means very brilliant colours are obtained on the copper, and by partially protecting the surface of the metal according to any determinate or ornamental pattern, very pleasing effects are produced, exhibiting great contrast of colours in a little space. As it is easy to render the copper nearly white by the method above described, I employ it for obtaining metallic specula or mirrors, as follows. I take an electrotype cast in copper from a polished plane or spherical metallic surface, which cast has nearly the same degree of polish as the original, and I then expose it to the action of vapours as above described, until it is sufficiently whitened, which is effected without injuring the polish. As the surface of the speculum thus obtained is already combined chemically with sulphur or one of the other bases or substances above mentioned, it is consequently less liable to tarnish or oxydate subsequently by any exposure to the atmosphere. With respect to this last part of my invention, I claim the colouring of copper surfaces by exposing them to the chemical action of the above-named substances.—In witness whereof, &c.

William Henry Fox Talbot.

Enrolled June 9, 1842.

SCIENTIFIC MISCELLANEA.

Progress of Foreign Science.

New Metallic Acids.

M. Fremy classes the whole of the metallic acids into, 1st, Those produced by direct combination of metal and oxygen, and which dissolve cold in alkalies. 2d, Those formed when an oxide of the metal is exposed at once to the action of an alkali and of an oxidizing body. The first class are very stable; the second, on the contrary, are remarkable for their instability.

In an extended research upon the relations and constitution of this latter class of acids, Fremy has discovered several new compounds of oxygen and metals. The most remarkable of these is the ferric acid, an oxide of iron playing the part of an acid, and having a constitution analogous to the chronic, manganic, and sulphuric acid, or $Fe\ O_3$. This acid may be obtained both by the dry and moist ways, in the former by calcining peroxide of potassum and sesqui-oxide of iron in a suitable vessel, or best by projecting ten grannens of dried nitrate of potass upon five grannens of iron at a bright red heat, a red mass is obtained rich in ferrate potass. In the moist way it is produced by transmitting chlorine through a strong solution of potass, holding sesqui-oxide of iron in suspension. He has formed an analogous acid of copper by like means, cupric acid. Fremy has also submitted the acid oxides of tin to a new examination. The stannic acid obtained by the action of nitric acid on the metal he shows to be monobasic and the formula of the stannates. $Sn^3\ O^6 + M\ O.$

while the acid obtained by decomposition of the chloride of tin, which he names metastannic acid, is tribasic, and the formula of its salt.

$$Sn^3\ O^6 + 3\ M\ O.$$

The stannates, heated with excess of alkali, are changed into metastannates.

The stannates are obtained by dissolving stannic acid cold in an alkali, the metastannates, either by dissolving in an alkali the metastannic acid obtained from the chloride of tin by an insoluble carbonate, or by calcining the former acid in a silver crucible with excess of base. Fremy has also discovered an oxide of tin intermediate to the protoxide and stannic acid, which is not to be confounded with the sesqui-oxide discovered by Fuchs. This compound is obtained by treating stannic acid cold with proto-chloride of tin. The acid instantly assumes a beautiful orange tint, and there remains in solution pure hydrochloric acid. This extremely interesting body is a stannate of protoxide of tin, and is a strict analogue of the molybdate of moloybdena, or the tungstate of tungsten, the chromate of chromim, &c., described long since by Berzilius.

Fremy proposes this change of colours in stannic acid, thus treated, as a good test of its identity.

A memoir upon this subject was read by Doctor Lyon Playfair, to the British Association, at its last Meeting. Fremy's memoir was read to the Academy of Sciences at Paris, 21st March, 1842.

A Monsieur Chuast has presented to the Academy a very useful instrument, and calculated to be of great service in preventing accidents of fire by the admission of coal gas to rooms, &c., lighted by it, owing to carelessness or bad gas fittings, &c. It is an instrument named by him a gazoscope, by which the presence of coal gas is rendered visible to the eye, whenever present in such quantity as to be at all near the range of an explosive mixture. The details are not given, and the invention is referred to a Commission to report.

LAW REPORTS OF PATENT CASES.

Court of Exchequer, Westminster Hall.

Before Lord Abinger *and a* Special Jury.

December 2, 1841.

CARPENTER *v.* SMITH.

Mr. Kelly, Mr. Montague Smith, and *Mr. Webster,* counsel for the plaintiff.

The Attorney-General and *Mr. Rotch,* counsel for the defendant.

Mr. Kelly.—May it please your Lordship, Gentlemen of the Jury.—The plaintiffs in this case, Mr. Carpenter and Mr. Young, are inventors of a great improvement in locks, for which a patent was obtained in the year 1832. In 1839 a disclaimer was lodged at the proper office, of some portions of the invention which had previously been claimed; this was opposed by certain parties before the late Solicitor-General, the present Mr. Baron Rolfe, but the objection to its admission was ultimately overruled, and the patent is now enjoyed under that specification and disclaimer of 1839.

The improvement of the plaintiff is one tending greatly to the convenience and security of the public, and having explained to you the nature of the invention, and the extent of the improvement, my task will be fully performed, because it is not disputed upon this issue that the invention is extremely useful; the only question, I apprehend, which my Learned Friend on the other side will be able to raise being as to its novelty, or whether the plaintiff was or not the first inventor, and upon that point, I think, before I sit down, I shall leave no doubt upon your mind.

Before the introduction of the present patent, the common locks opening and shutting by means of a key, were known in every variety of form. What is commonly

called a lever latch, which is placed upon outer doors, particularly of chambers and places of that description, was also perfectly well known; it was found, however, that it would be extremely desirable to combine both the lock and the latch of the door in one rim or instrument, instead of having them separated, as they had heretofore been. To effect this object various improvements were invented by divers persons, and particularly at Birmingham and Sheffield, none of which succeeded until the invention of the present plaintiffs, which I will now proceed to explain.

Some of the figures referred to in the specification having been disclaimed, the material figures which remain are 2, 3, and 4. Figure 2, *a*, *a*, is an ordinary bolt with its tumbler, which is locked and unlocked by means of a key in the usual way. *b*, *b*, is a lever spring-bolt, commonly called a latch, distinguishable from the other bolt by its being moved upon a lever. Supposing the ordinary bolt to be shut, you must, of course, turn the key to open it; having done this, one more turn of the key raises the lever-bolt or latch also. *d*, is the key which presses against a flat piece of brass or iron, E, moving on its centre, *f*. The piece of brass is so formed that when the key presses against the lever it moves it upon what is called its centre; that portion being so moved the latch rises. This piece of brass, E, is only of use where it is desirable (as it is in many cases, although in others it is not so) to have both the bolt or common lock and the lever-bolt or latch open by the same key. This is desirable, for example, for gentlemen who reside in chambers or lodgings having the outer door open, the one key opening both the lock and the latch. That is effected by this piece of brass. Where it is not necessary, as it is not in many cases, to have the lock and the latch opened by the same key, then a common handle is used, and plate, E, is dispensed with. This brass plate is

not essential to the invention, the principle of which is the combination of the lock and the latch in the same rim, forming, in fact, one instrument. You may have a handle or separate key for the latch instead of the brass plate.

I will now proceed to the other parts of the specification. "The pin, *h*, in the bolt moves in the groove of the flat piece of brass or iron, and as the bolt moves in or out it gives liberty to the key, *d*, to move the way it is wanted." That, Gentlemen, is the hole immediately above the screw in the bolt, and it is necessary in order to enable the whole machinery to work. The piece, E, moves on without disturbing the bolt of the lock which is underneath. This hole is made large enough for the screw to move up and down in it, and by means of that the lock may be fastened or unfastened, thrown backwards or forwards, without interfering with the latch that is above, which must otherwise have been the case. "As the bolt moves in or out, it gives liberty to the key, *d*, to move the way it is wanted, the slide and dovetail on the lever or bolt keeps it fast when required." "At the back of the lock is a nob or handle, which is screwed or riveted into the lever or spring-bolt, and a perpendicular groove made in the plate to allow the nob or handle to be raised when required."

The follower, *i*, is intended to act on the lever or spring-bolt when it is spindled, with a handle on each side to lift up the lever or spring-bolts without the assistance of a flat piece of brass or iron, E, as the latter is intended to open the door outside by the key only. This is merely a more ample specification of what I have already explained, that where the object is not to open the latch as well as the bolt with the same key, then the brass plate is dispensed with, and an outside handle or separate key may be used.

Then the specification proceeds:—"The above improvements will always work pleasantly and wear better than any other lock invented for the same purpose. The staple and striker to the above lock are represented in fig. 3. The staple and striker are very simple. Here is a box staple, to which the striker is riveted. The lever or spring-bolt runs up this inclined plane to *d*, where it drops into the box staple, and becomes fastened.

Fig. 5, having been disclaimed, I need not trouble you with it. Having thus explained the machinery of this lock, I will now state the nature of the evidence I shall have to lay before you. I shall prove, by witnesses accustomed to this branch of manufacture for years, and extensively engaged therein, that previous to the patent of the plaintiffs, this combination was entirely new, at all events in this country, that the advantages of this combination are so great, that incalculable quantities of the article are sold, both in this country, America, and various other places, and since the date of the patent the trade of this country has considerably increased in this single article. With regard to cheapness, it is evident that here you have one lock instead of two, and of course there is a saving effected of the difference between the price of one lock instead of two. The plaintiffs having conferred this benefit upon the public, are entitled to the reward of their merit, provided the invention should be found to possess sufficient novelty; for it is not pretended that the alleged invention is not a useful and real improvement; there is no such plea on the record; the utility, therefore, must be taken not merely upon my statement, but also upon the admission of the defendant. With regard to the novelty of this patent, persons perfectly competent, from their long practice in improvements and complete knowledge of this subject, will prove that this invention was new.

The only way by which I conceive this evidence will be met on the other side, will be by an attempt to show that a

lock somewhat like this may have been made in some part of the world, but where, it is impossible to tell. However, I will not occupy your time by anticipating evidence which, after all, may not be given. I am quite sure if any such attempt be made by my Learned Friend, that it will entirely fail. Many unsuccessful attempts were made in former days, but none of them capable of being brought into practicable operation for the use and benefit of the public. We know by previous cases, that these unsuccessful attempts will not be allowed to interfere with the rights of the man who ultimately brings the matter to perfection. The evidence I shall lay before you will convince you that the invention was entirely new at the time of the patent; that the defendants, in the imitation they have made, have been guilty of an infringement of that patent; and your verdict, Gentlemen, for the plaintiffs, will establish their right to the benefit of the patent they have obtained.

Gentlemen, there are some objections on the record to which I shall call my Lord's attention rather than yours; the questions of fact being for your consideration, the questions of law for his Lordship's. In order that you may know what we have to say, I will go briefly through the pleas and notices of objection. They say first, "That the defendant has not been guilty of any infringement of the letters patent, as charged on him by the declaration." I will explain to you, Gentlemen, what that means. The defendant has made a great number of locks, and sold them for profit, precisely upon the principle I have exhibited to you, with the exception that, instead of making the lock to be opened with one key only, he has made the lock to open with one key, and the latch with another, or with a handle.

Gentlemen, I have not before exhibited to you the old common lock which everybody knows, with a sliding bolt at the top, opened by a handle, and a bolt below opened by a key; but the combination of this lever-bolt or

latch, lifted by the same key as turns the ordinary bolt of the lock, is entirely new, and had never been used before. This is the principle of the invention. He has used the same machinery with the exception of the plate, E, the effect of which is, as I have already stated, to open the lock and the latch with the same key. It is easy for my Learned Friend to endeavour to do away with the effect of the combination of machinery, which never had been used or carried into effect in this world before, by saying he has used a lever latch and a common lock in the same instrument. Attempts had been made to do this; but the plaintiff's combination is totally different from anything that existed before the date of his patent. With the exception of this plate, E, the locks and the receptacle for the locks which have been used by the defendant, are identical with those for which the plaintiffs have taken out their patent. There can be no doubt, therefore, if the patent be established, that the defendants have infringed it.

The defendant then says, "that the plaintiffs are not the first and true inventors of the said alleged invention for which the said letters patent were granted." That is, in point of fact, the principal question between these parties, which I will pass over for the present. Then the fourth is, "That the specification set forth in the declaration is insufficient, inasmuch as it does not set out what parts are old, and what new, of the lock; and also inasmuch as it disclaims the separate parts of the locks without saying what is intended to be claimed, while the title of the patent is for improvements in locks only; at the same time that much is said in the specification about box staples and catches, which are no parts of the lock, as appears by the specification, which treats of them as distinct inventions from the locks, and are as distinct as the key is from the lock." If these objections to the specification are well founded, the defendant may have the benefit of them, by moving the Court to enter a

verdict on that issue, or moving in arrest of judgment. My Learned Friend agrees they are questions of law.

(To be continued.)

Judicial Committee of the Privy Council.
December 8, 1842.

(Present—Lord CAMPBELL, *Mr. Justice* ERSKINE, *the Judge of the Prerogative Court, the Judge of the Admiralty Court.)*

SIMISTER'S PATENT.

Mr. M. D. Hill and *Mr. Webster* appeared in support of the petition, which was opposed by the *Solicitor-General* and *Mr. Cowling*, on the part of the staymakers.

This was an application under Lord Brougham's Act, for an extension of the term of a patent granted on the 18th of December, 1829, to Mr. James Simister, of Birmingham, staymaker, for "an invention of improvements in weaving, preparing, or manufacturing a cloth or fabric, and the application thereof to the making of stays and other articles of dress, which improvements are also applicable to other purposes." The petition stated, that before this invention the cloth used for stays (sateen) was woven according to the usual and well-known methods of weaving, and stays were made by placing two surfaces of such cloth together, and sewing or stitching by the hand in such manner as to leave the requisite spaces for the introduction of the whalebone, steel, wood, cotton, or other article or material with which stays were filled; and that in stays so made the work was not performed with so much regularity, the stays in the process of making became soiled, and they did not fit so easily or pleasantly to the wearer. The petitioner, after bestowing much labour and expense in devising means to obviate these defects, had succeeded in dis-

covering a method of weaving, whereby the cloth or fabric might be formed into stays, consisting of two surfaces united together in a proper manner, the requisite open spaces to be filled with whalebone so being left or made at the time the cloth was woven, and the method so discovered was applicable to other articles of dress, such as braces, purses, bags, or reticules, &c.

The extension of the term of the patent was moved for on the ground of the invention being of public utility, and on account of the expense the applicant had been put to in perfecting it, and in law proceedings.

Several witnesses were heard in support of the application, which was opposed by

The Solicitor-General, on the ground that the described fabric was not a new invention, and because the applicant had failed to prove that the invention (if it were one) was of public utility, or that he had not derived that emolument from it to which he was fairly entitled.

After a short deliberation,

Lord Campbell said, that in this case their Lordships were of opinion that no sufficient case had been made out to entitle the applicant to a renewal of his patent.

PATENTS GRANTED FOR SCOTLAND,

From November 3 to November 9, 1842.

JOHN CLAY, of Cottingham, in the county of York, Gentleman, and FREDERICK ROSENBORG, of Sculcoates, in the county of York, Gentleman, for improvements in arranging and setting up types for printing.—Sealed November 318 42.

JAMES PILBROW, of Tottenham-green, in the county of Middlesex, Engineer, for certain improvements in the application of steam-air and other vapours and gaseous agents to the production of motive power, and in the machinery by which the same is effected.—Sealed November 7, 1842.

FRANCIS ROUBILIAC CONDER, of Highgate, in the

county of Middlesex, Civil Engineer, for improvements in the cutting and shaping of wood, and in the machinery for that purpose.—Sealed November 9, 1842.—(Communicated by a foreigner residing abroad).

LIST OF ENGLISH PATENTS.

THOMAS MANSELL, of Birmingham, Agent, for certain improved machinery for cutting or shaping leather, paper, linen, lastings, silks, and other fabrics.—Sealed December 3, 1842.—(*Six months.*)

EBENEZER TIMMINS, of Birmingham, Manufacturer, for certain improvements in apparatus used for arresting the progress of, and extinguishing fire.—Sealed December 3, 1842.—(*Six months.*)

EDWARD COBBOLD, of Melford, in the county of Suffolk, Clerk, Master of Arts, for certain improvements in instruments for writing or marking, part or parts of which improvements are applicable to brushes for water-colour drawings.—Sealed December 3, 1842.—(*Six months.*)

JOHN STUBBINS, of Nottingham, Hosier, for improved combinations of machinery to be employed for manufacturing certain parts of articles in stocking or lace fabrics. —Sealed December 3, 1842.—(*Six months.*)

DON PEDRO POUCHANT, of Glasgow, Civil Engineer, for a certain improvement or improvements in the construction of machinery for manufacturing sugar.—Sealed December 3, 1842.—(*Six months.*)

JOHN SEALEY, of Bridgwater, Merchant, for an improved tile.—Sealed December, 3, 1842.—(*Two months.*)

CHARLES HEALD WILD, of Birmingham, Engineer, for an improved switch for railway purposes.—Sealed December 3, 1842.—(*Six months.*)

THOMAS HOWARD, of Hyde, Chester, Manufacturer, for certain improvements in machinery for preparing and spinning cotton, wool, flax, silk, and similar fibrous material.—Sealed December 3, 1842.—(*Six months.*)

WILLIAM HANCOCK, jun., of Amwell-street, Gentleman

for certain improvements in bands, straps, and cords for driving machinery, and other mechanical purposes.—Sealed December 3, 1842.—(*Six months.*)

Frederick William Etheridge, of Frindsbury, Gentleman, for certain improvements in the manufacture of bricks, tiles, and other similar plastic substances.—Sealed December 3, 1842.—(*Six months.*)

William Henry Stuckey, of Guildford-street, Esq., for certain improvements in filtering water and other fluids.—Sealed December 3, 1842.—(*Six months.*)

William Pope, of the Edgeware-road, Ironmonger, for an improved stove.—Sealed December, 6, 1842.—(*Six months.*)

William Oxley English, of Kingston-upon-Hull, Distiller, for improvements in purifying spirits of turpentine, spirits of tar, and naptha.—Sealed December 8, 1842.—(*Six months.*)—Communicated by a foreigner residing abroad.

William Coley Jones, of Vauxhall-terrace, Practical Chemist, and George Ferguson Wilson, of Vauxhall, Gentleman, for improvements in operating upon certain organic bodies or substances, in order to obtain products or materials therefrom, for the manufacture of candles and other purposes.—Sealed December 3, 1842.—(*Six months.*)

William Smith Harris and Septimus Hamel, both of Leicester, Cotton-winders and Copartners, for improvements in the manufacture of reels for reeling cotton and linen thread.—Sealed December 8, 1842.—(*Six months.*)

William Kempson, of the borough of Leicester, Manufacturer, for improvements in the manufacture of muffs, cuffs, ruffs, tippets, mantillas, pelerines, dressing-gowns, boots, shoes, slippers, coats, cloaks, shawls, stocks, cravats, capes, boas, caps, bonnets, and trimmings, for parts of dress.—Sealed December 8, 1842.—(*Six months.*)

George Purt, of Saint Mary-at-Hill, Soda-water-manufacturer, and William Hale, of Woolwich, En-

gineer, for improvements in producing aerated liquors.—Sealed December 8, 1842.—(*Six months.*)

Richard Barber, of Leicester, Reel Manufacturer, for improvements in the manufacture of boots, shoes, and clogs.—Sealed December 8, 1842.—(*Six months.*)

John George Bodmer, of Manchester, Engineer, for certain improvements in the manufacture of metallic hoops and tyres for wheels, and in the method of fixing the same for use, and also improvements in the machinery or apparatus to be employed therein.—Sealed December 8, 1842.—(*Six months.*)

William Edward Newton, of Chancery-lane, Civil Engineer, for certain improvements in the construction and arrangement of axles and axle-trees for carriages, carts, and other vehicles, used on rail or other roads.—Sealed December 8, 1842.—(*Six months.*)—Communicated by a foreigner residing abroad.

William Lomas, of Manchester, Worsted Spinner, and Isaac Shimwell, of the same place, Worsted Spinner, for certain improvements in the manufacture of fringes, cords, and other similar small wares, and also in the machinery or apparatus for producing the same.—Sealed December 8, 1842.—(*Six months.*)

John Grantham, of Liverpool, Engineer, for certain improvements in the constructions and arrangements of the engines and their appendages for propelling vessels on water.—Sealed December 8, 1842.—(*Six months.*)

James Brown, of Soho, Birmingham, Engineer, for certain improvements in steam-engines and steam-propelling machinery.—Sealed December 8, 1842.

Benjamin Fothergill, of Manchester, Machine Maker, for certain improvements in machines called mules, and other machines for spinning cotton-wool and other fibrous substances.—Sealed December 8, 1842.—(*Six months.*)

Percival Moses Parsons, of Waterloo-road, Surrey, Civil Engineer, for certain improvements in steam-engines

and boilers, and in motive machinery connected therewith.—Sealed December 8, 1842.—(*Six months.*)

Charles Keene, of New Bond-street, Hosier, for improvements in the manufacture of hose, stocks, drawers, gloves, mitts, caps, comforters, and cuffs.—Sealed December 15, 1842.—(*Six months.*)

William Palmer, of Sutton-street, Clerkenwell, Manufacturer, for improvements in the manufacture of candles.—Sealed December 15, 1842.—(*Six months.*)

Thomas Cardwell, of Bombay, in the East Indies, Merchant, for improvements in the construction of presses for compressing cotton and other articles.—Sealed December 15, 1842.—(*Six months.*)

Moses Poole, of Lincoln's-inn, Gentleman, for improvements in dressing mill-stones.—Sealed December 15, 1842.—(*Six months.*)—Communicated by a foreigner residing abroad.

Charles Maurice Elizee Saulter, of Austin-friars, in the City of London, Gentleman, for improvements in the manufacture of sulphuric acid. — Sealed December 13, 1842.—(*Six months.*)—Communicated by a foreigner residing abroad.

Guillaume Simon Richault, of the Sabloniere Hotel, Leicester-square, Editor of Music, for improvements in apparatus for exercising the fingers of the human hand in order to facilitate their use in the playing of the piano-forte and other instruments.—Sealed December 15, 1842.—(*Six months.*)—Communicated by a foreigner residing abroad.

James Winchester, of Wood-street, Hatter, for certain improvements in steam-boilers, and in the methods of applying steam or other power to locomotive purposes.—Sealed December 15, 1842.—(*Six months.*)

Edward Robert Rigby, and Charles John Rigby, of Gracechurch-street, Brush Manufacturers and Copartners, for an improvement or improvements in the manufacture of certain articles in which bristles have

been or are now used.—Sealed December 21, 1842.—(*Six months.*)

GABRIEL HIPPOLYTE MOREAU, of Leicester-square, Gentleman, for certain improvements in steam generators.—Sealed December 21, 1842.—(*Six months.*)

GABRIEL HIPPOLYTE MOREAU, of Leicester-square, Gentleman, for certain improvements in propelling vessels.—Sealed December 21, 1842.—(*Six months.*)

JOHN SQUIRE, of Ponghill, Cornwall, Engineer, for certain improvements in steam-boilers or generators.—Sealed November 21, 1842.—(*Six months.*)

TAVERNER JOHN MILLER, of Millbank-street, Westminster, Oil Merchant, for improvements in apparatus for supporting a person in bed, or when reclining.—Sealed November 21, 1842.—(*Six months.*)

WILLIAM BRIDGES, of Birmingham, Button Tool Maker, for certain improvements in buttons.—Sealed December 21, 1842.—(*Six months.*)

HENRY PURSER VAILE, late of Fleet-street, Gentleman, for improvements in combining mechanical instruments for obtaining power.—Sealed December 22, 1842.—(*Six months.*)

JOSEPH BEAMAN, of Smethwick, Stafford, Ironmaster, for an improvement in the manufacture of malleable iron.—Sealed December 22, 1842.—(*Six months.*)

WILLIAM GODFREY KNELLER, of Wimbledon, chemist, for improvements in the manufacture of soda in the evaporation of brine and in the concentration and manufacture of sulphuric acid.—Sealed December 22, 1842.—(*Six months.*)

ROBERT WILSON, of Manchester, Engineer, for certain improvements in locomotive and other steam-engines.—Sealed December 22, 1842.—(*Six months.*)

JAMES MORRIS, of Cateaton-street, London, Merchant, for improvements in locomotive and other steam-engines.—Sealed December 22, 1842.—(*Six months.*)

Macintosh, Printer, Great New-street, London.

LAW REPORTS

OF

PATENT CASES.

COLLECTED BY

WILLIAM CARPMAEL, ESQ.,

OF LINCOLN'S-INN.

LONDON:

PRINTED AND PUBLISHED FOR THE PROPRIETOR,

BY A. MACINTOSH, 20, GREAT NEW STREET.

MDCCCXLIII.

PREFACE.

THE various Reports of proceedings at law and in equity relating to patents for inventions which have been printed are only to be found in extensive law libraries, distributed over upwards of one hundred volumes, and in very few instances are there to be found two Reports of patent cases in one volume; the patentee, the inventor, and the manufacturer can therefore have no opportunity of becoming acquainted with the views and opinions of the Judges on the various questions of patent law, and the constructions which have been put on the wording of the specifications.

To draw a specification correctly requires a thorough knowledge of the various decisions in causes involving patent rights, also an intimate acquaintance with the practical working of the invention to be described; and further, in order that the extent of the invention may be well defined, correct and extensive information should be possessed by the person engaged as to what has been previously patented and used in the manufacture to which the invention relates. There are no rules for drawing a specification as there are for preparing other legal documents, the language of a specification is necessarily that of the factory, the technical terms and expressions of the workshop must be used in order to

a workman understanding the description of a patented invention, and these are often wholly incomprehensible to a Judge and to other legal men until they are explained. These circumstances render it very difficult to obtain a correct legal opinion of what is the contents of a specification, or the probable construction which a court of law would put upon it. A manufacturer may thoroughly understand the working of the invention described, but for want of information as to the construction put by courts of law on similar documents, he is unable to judge of the legal extent of the claims to invention. If a barrister be consulted and he be not intimately acquainted with the practical working of the particular manufacture, and with what had been the precise state of that manufacture before the patent (which can very seldom be the case), his opinion will be of little use—in fact, counsel's opinion on a patent can only be useful when he is made acquainted with all the facts which surround the case both for and against the patent;—on the other hand, a man of science unpractised in law is only qualified to judge of the correctness of the description of the invention, as to whether it is sufficient to enable a workman to carry it into practice. Law, science, and much practical knowledge of manufactures are necessary to be possessed by the same individual, or brought together in different persons, in order to draw a specification, or to give a correct opinion of the construction which a court of law will put on a particular specification.

I have often been requested to publish a collection of the law reports of patent cases for the benefit of patentees, manufacturers, and inventors, in order that they who already understand the practical part of the question may become better able to judge of the legal

construction of specifications, or at least be better able to consult others as to the extent of invention claimed by such documents. It appears to me that publishing the law reports of patent cases without the specifications, or so much thereof as have been called into question, would not be sufficient. I therefore propose to give the specifications, or the parts inquired into, together with the substance of the evidence for and against the patents; and when necessary, such further explanations of the state of the particular manufactures previous to the dates of the patents in question, as will enable the reader better to understand the full extent of the invention, for the want of which information many of the published reports are scarcely to be understood even by legal men, certainly not by the general reader.

It may be objected by some, that a work of this description should only come from a gentleman of the bar. If this publication were intended chiefly for legal men, such an objection would have much more force than it can have when it is understood that the principal object of collecting and publishing the reports of patent cases, is to give information to the manufacturer, the patentee, and the inventor. I may, however, state, as a justification of my venturing into print on such a subject, that some years back I studied for and qualified myself to be called to the bar; added to which, I have for several years had extensive practice as a civil engineer, particularly in those branches of that profession which relate to machinery, and the application of the mechanical arts to the production of manufactures. I have also long advised on subjects of patent law;—these circumstances induce me to hope, that I am not unqualified to produce a work, which may fairly be considered to require a knowledge of two professions—law and engineering.

One great cause of litigation in patents has been the want of understanding as to what is the subject-matter of a patent, and how far an inventor can claim for a particular invention. Many have supposed, and do now suppose, that a patentee can only claim the exact details of machinery or process which he describes as the means of carrying out his invention; and it is only of late years that courts of law have clearly laid it down, and established the principle, that an inventor may fairly and properly claim, not only the details which he practises, but also the application of the peculiar character or principle of the invention which he has for the first time brought to bear in a particular manufacture. Thus in the case of *Russell* v. *Cowley*, the patentee was not confined to the particular dies used when leaving out the maundril in welding iron tubes; but the claim of invention was held to be, the using of any dies suitable for giving the requisite external pressure, when the iron, at a welding heat, was drawn or passed through them, without the internal support of a maundril. In the case of *Minter* v. *Wells*, the claim was for the application of a self-adjusting leverage to the back and seat of a chair, producing certain effects; it was held that any application of a self-adjusting leverage to the back and seat of a chair, producing these effects, was an infringement of the patent. The cases of *Jupe* v. *Pratt*, *Morgan* v. *Seaward*, *Fisher* v. *Dewick*, and many others, have all gone to support this enlarged view of the inventor's rights.

There is another point of patent law which is very little understood, and that is, what quantity of using of an invention before the date of a patent, will destroy its validity: the publication of the various cases involving that point, will enable parties to understand this part of the subject.

My object in publishing these reports is to advance a correct knowledge of the subject amongst those most interested—the patentee, the inventor, and the manufacturer, in the hope that patented inventions may be still better secured, and litigation lessened.

WILLIAM CARPMAEL.

Lincoln's Inn, Dec. 1, 1842.

LAW REPORTS

OF

PATENT CASES.

THE STATUTE OF MONOPOLIES.

21st James I., c. 3, A.D. 1624.

An Act concerning monopolies and dispensations, with penal laws and the forfeiture thereof.

All monopolies shall be void.

Forasmuch as your Most Excellent Majesty, in your Royal judgment, and of your blessed disposition to the weal and quiet of your subjects, did, in the year of our Lord God One thousand six hundred and ten, publish in print to the whole realm, and to all posterity, that all grants of monopolies, and of the benefit of any penal laws, or of power to dispense with the law, or to compound for the forfeiture, are contrary to your Majesty's laws, which, your Majesty's declaration is truly consonant and agreeable to the ancient and fundamental laws of this realm.

And whereas your Majesty was further graciously pleased expressly to command that no suitor should presume to move your Majesty for matters of that nature; yet, nevertheless, upon mis-informations and untrue pretences of public good, many such grants have been unduly obtained and unlawfully put in execution, to the great grievance and inconvenience of your Majesty's subjects, contrary to the laws of this realm, and contrary to your Majesty's most Royal and blessed intention, so published as aforesaid: for avoiding whereof and preventing the like in time to come, may it please your Excellent Majesty, at the humble suit of the Lords spiritual and temporal, and the Commons in this present

Parliament assembled, that it may be declared and enacted by authority of this present Parliament, that all monopolies and all commissions, grants, licenses, charters, and letters patent heretofore made or granted, or hereafter to be made or granted to any person, or persons, bodies politic or corporate whatsoever, of or for the sole buying, selling, making, working, or using of any thing within this realm or the dominion of Wales, or of any other monopolies, or of power, liberty, or faculty to dispense with any others, or to give licence or toleration to do, use, or exercise any thing against the tenor or purport of any law or statute, or to give or make any warrant for any such dispensation, license, or toleration to be had or made, or to agree or compound with any others for any penalty or forfeitures limited by any statute, or of any grant or promise of the benefit, profit, or commodity of any forfeiture, penalty, or sum of money, that is or shall be due by any statute, before judgment thereupon had; and whatsoever in any way tending to the instituting, erecting, strengthening, furthering, or countenancing of the same, or any of them, are altogether contrary to the laws of this realm; and so are and shall be utterly void and of none effect, and in no wise to be put in use or execution.

II. And be it further declared and enacted by the authority aforesaid, that all monopolies, and all such commissions, grants, licenses, charters, letters patent, proclamations, inhibitions, restraints, warrants of assistance, and all other matters and things tending as aforesaid, and the force and validity of them and of every of them, ought to be and shall be for ever hereafter examined, heard, tried, and determined by and according to the common law of this realm and not otherwise.

III. And be it further enacted, by the authority aforesaid, that all person and persons, bodies politic and corporate, whatsoever, which now are, or hereafter shall be, shall stand, and be disabled, and uncapable to have, use, exercise, or put in use, any monopoly or any such commission, grant, licence, charter, letters patents, proclamation, inhibition, restraint, warrant of assistance, or other matter or

thing tending as aforesaid, or any liberty, power, or faculty, grounded, or pretended to be grounded upon them, or any of them.

IV. *(Any party grieved by a pretext of a monopoly shall recover treble damage and double costs.)*

V. Provided nevertheless, and be it declared and enacted, that any declaration before mentioned shall not extend to any letters patents and grants of privilege, for the term of one and twenty years or under, heretofore made, of the sole working or making of any manner of new manufacture, within this realm, to the first and true inventor or inventors of such manufactures, which others, at the time of the making of such letters patents and grants, did not use, so they be not contrary to the law, nor mischievous to the State, by raising of the prices of commodities at home, or hurt of trade, or generally inconvenient; but that the same shall be of such force as they were, or should be, if this Act had not been made, and of none other: and if the same were made for more than one and twenty years, that then the same, for the term of one and twenty years only, to be accounted from the date of the first letters patents, and grants thereof made, shall be of such force as they were, or should have been, if the same had been made; but for term of one and twenty years only, and as if this Act had never been had or made, and of none other.

VI. Provided also, and be it declared and enacted, that any declaration, before mentioned, shall not extend to any letters patents and grants of privilege, for the term of fourteen years or under, hereafter to be made, of the sole working or making of any manner of new manufactures within this realm, to the true and first inventor and inventors of such manufactures which others, at the time of making such letters patents and grants, shall not use, so as also they be not contrary to the law, nor mischievous to the State, by raising prices of commodities at home, or hurt of trade, or generally inconvenient, the said fourteen years to be accounted from the date of the first letters patents, or grant of such

privilege hereafter to be made; but that the same shall be of such force as they should be if this Act had never been made, and of none other.

VII. *(This Act not to extend to grants by Parliament.)*

VIII. *(Warrants granted to justices saved from the effects of this Act.)*

IX. *(Charters granted to corporations saved from the effects of this Act.)*

X. *(Letters patents that concern printing, salt-petre, gunpowder, great ordnance, shot, or offices saved.)*

XI. *(This Act not to extend to commissions for allum mines.)*

XII. *(This Act not to extend to the liberties of Newcastle-upon-Tyne, nor tavern licences.)*

XIII. Provided also, and be it enacted, that this Act, or any declaration, provision, penalty, forfeiture, or other thing, before mentioned, shall not extend or be prejudicial to a grant or privilege for or concerning the making of glass, by his Majesty's letters patents, under the great seal of England, bearing date the two and twentieth day of May, in the one and twentieth year of his Majesty's reign of England, made and granted to Sir Robert Mansell,*

* Patent to Sir Robert Mansell, granted the 22d day of May, in the 21st year of the reign of James I.

This patent recites that in a patent granted in the twelfth year of the same reign it is mentioned that a scarcity of wood was resulting from the general demand, and that it was necessary to obtain supplies from foreign countries, that it was necessary by good laws to ensure the preservation and increase of timber and wood, that perceiving that glass works and working of glass with timber and wood to be one of the greatest and the thiefest means to consume timber, a grant was made to Sir Jerome Bowes, Knight, within England and Ireland, for a certain term, prohibiting all other persons making glass, with power to put an end to such patent. That a similar grant was made to Sir Percival Hart, Knight, and Edward Fawcett, Esq., commencing from the expiration of the grant to Sir Jerome Bowes, Knight. The patent also recites several other similar grants; it then recites that such grants had become prejudicial and hurtful unto the realm, there being then lately presented by Thomas Percival, Esq., a project of new invention for making all manner of glasses *with pit coal and other fuel, not being timber or wood,* for which the said letters patent of January in the twelfth year of the said reign was granted to Thomas Percival, Sir Robert Mansell, and others, for twenty-one years, within England and Wales or else-

Knight, Vice Admiral of England; nor to a grant or letters patents, bearing date the twelfth day of

where, with sea coal, pit coal, or any other fuel whatsoever, not being timber or wood, yielding and paying to the crown an annual rental of 1,000*l.* That patent then prohibits all persons from buying or contracting for any sort of glass made in foreign countries, and from selling or uttering any such glass. The patent then recites that Sir R. Mansell had contracted with the other patentees, and was willing to take on himself the rental and all other liabilities, and that the patent of the twelfth year of the said reign had become liable to be rendered void at common law, in consequence of having become hurtful and prejudicial owing to the high charges for the glass, and the letters patent were complained of in Parliament as a grievance. The patent then sets forth that, "Know ye, that we, taking the premises into our gracious and princely consideration, do hereby declare that, inasmuch as the said letters patent bearing date the said 19th day of January, and other letters patent before mentioned and recited, did become prejudicial to the public, and in the execution of them grievous to our loving subjects, that we will not hereafter take upon us the defence or protection of any of the said letters patent." . . . "And yet nevertheless, upon deliberation, advice with the Lords and others of our Privy Council, and at the humble petition of the said Sir Robert Mansell, that the making of glass of all kinds within this kingdom with sea coal and pit coal was brought to a full and exact perfection for the use and good of our kingdom, with the expense of his whole fortune; upon due consideration of the many and faithful services of the said Sir Robert Mansell, and finding by the petitions and certificates of glass sellers," &c., &c. (. . .) "That the glass made by the said Sir Robert Mansell was perfectly good, clear, and merchantable, or rather better than formerly was made with wood." (. . . . .) "We are pleased and resolved, and do hold it most requisite and necessary for the good and benefit of this realm, that the making of glass with sea coal and pit coal be continued, and that all making of glass with wood for ever hereafter shall cease, and the privilege for sole making thereof with sea coal and pit coal shall be renewed to the said Sir Robert Mansell, not only as a token of our grace and favour towards him, by his many and well-deserved services, but as a recompense for the great charge and expense which for upholding and bringing of that work to full perfection, he hath disbursed to the weakening of his estate; but yet, without any restraint of the importation of foreign glass and burden of rent, or otherwise which might occasion the enhancing of prices to our subjects, whereby all just grievances shall be taken away, by our loss of the annual rent which upon the said letters patent was reserved unto us." The patent then goes on to grant the sole privilege of making glass by sea coal or pit coal to the said Sir Robert Mansell for fifteen years, prohibiting all other persons making glass in any way, giving very strong powers to search out infringement.

It is evident that this patent, if not specially saved by the

June, in the thirteenth year of his Majesty's reign of England, made to James Maxewell, Esquire, concerning the transportation of calves' skins; but that the said several letters patents, last mentioned, shall be and remain of the like force and effect, and as free from the declarations, provisions, penalties, and forfeitures, before mentioned, as if this Act had never been had nor made, and not otherwise.

XIV. Provided also, and be it declared and enacted, that this Act, or any declaration, provision, penalty, forfeiture, or other thing, before mentioned, shall not extend or be prejudicial to a grant or privilege for or concerning the making of smalt, by his Majesty's letters patent, under the great seal of England, bearing date the sixteenth day of February, in the sixteenth year of his Majesty's reign of England, made or granted to Abraham Baker; *

above clause of the statute, would have been liable to be set aside as a monopoly, because it granted the sole right of making an old article or manufacture—if the patent had been granted only for the sole right of applying sea coal or pit coal in the manufacture of glass, and that had been a new invention at the time, it would have been a good subject for a patent under the above statute of James I., and would not have required to have been saved, but it was not a new invention so to use coal, a previous patent having been in force for several years, and surrendered in order that these letters patent should be granted.—W. C.

* *Letters patent granted to Abraham Baker, 16th February, in the sixteenth year of the reign of James I., for the manufacture of smalt.*

This patent recites that the previous patent granted to the said Abraham Baker and Sir George Hay, Knight, had been surrendered to be cancelled and made void. The patent then makes a grant in the following words:—"Know ye, that we, as well in consideration of the faithful and acceptable service to us done and performed by our trusty and well-beloved servant, the said George Hay, Knight, one of the Gentlemen of our Privy Chamber, and in consideration of his great costs, charges, and expenses, bestowed in assisting the said Abraham Baker in the discovery, finding out, and perfecting of the said art and invention of making, working, and compounding of the said smalt, by these presents, for us, our heirs, and successors, at the humble request and nomination of the said Sir George Hay, do give, grant, and confirm unto the said Abraham Baker, full, free, lawful, and absolute power, license, and authority, that he the said Abraham Baker, his executors, administrators, deputies, factors, assigns, and servants, and every or any of them only, and none other shall, and may from time to time, and at all times hereafter, during the term of thirty and one years next, and immediately following after the date hereof."

nor to a grant or privilege for or concerning the melting of iron ewer, and of making the same into cast works or bars with sea coals or pit coals, by his Majesty's letters patents, under the great seal of England, bearing date the twentieth day of February, in the nineteenth year of his Majesty's reign of England, made or granted to Edward Lord Dudley; *

The patent requires Baker to covenant that the supply of smalt shall be sufficient and as good and cheap as that brought from abroad, and various powers are given to the said Abraham Baker, and all importation and making of smalt is prohibited.

The reasons before given for saving the patent for glass-making from the operation of the statute, apply to the present patent for making of smalt. Had it not been saved by the statute of James the First, it would have been declared a monopoly under that statute.—W. C.

* *Letters Patent granted to Edward Lord Dudley, the 22d February, in the 19th year of the reign of James the First, for the Manufacture of Iron with Sea-coal or Pit-coal.*

" . . . . Whereas our right trusty and well-beloved Edward Earl Dudley hath, at his great travail and industry," . . . . " found out the mystery, art, way, and means of melting of iron ewer, and of making the same into cast works or bars, with sea-coal or pit-coal, in furnaces with bellows, of as good condition as hath been heretofore made of charcoal, a work and invention not formerly performed by any within this our kingdom of England, we graciously favouring and willing to cherish such ingenious and profitable inventions, and finding that the working and making of the said iron, by the means aforesaid, within this kingdom, will not only in itself tend to the public good thereof, but also thereby the great expense and waste of timber and wood converted into charcoal, and consumed upon iron works will be much abated, and the remnant of wood and timber within this land will be much preserved and increased." . . . . "Know ye, that we, for the causes aforesaid, and other good considerations us hereunto moving of our especial grace, certain knowledge and mere motion, have given and granted, and by these presents, for us, our heirs and successors, do give and grant unto the said Edward Lord Dudley, his executors, administrators, and assigns, full and free liberty, license, power, and authority, that they and every of them, by him or themselves, or his or their deputies, factors, servants, or workmen, at his and their charges, shall and may, at all and every time and times, and from time to time, during the term of fourteen years next ensuing the date hereof, use, exercise, practise, and put in use, within this our realm of England and the dominion of Wales, at his and their liberty and pleasure, the said mystery, art, way, and means of melting iron ewer, and of making the same into cast work, or bars with sea-coal or pit-coal, in furnaces with bellows." . . . . The patent then restrains all parties whatsoever from making iron with pit-coal or sea-coal without the license of Edward Lord Dudley, and gives powers for pulling down any furnaces put up for such pur-

but, that the same several letters patents and grants shall be and remain of the like force and effect, and as free from the declarations, provisions, penalties, and forfeitures, before mentioned, as if this Act had never been had nor made, and not otherwise.

11TH HENRY VI. c. 1.

For Regulating the Dates of Letters Patent.

WHEREAS, by suit made to the King by divers persons, it hath been desired by their petitions to have offices, farms, and other things, of the gift and grant of the King by his gracious letters patent thereof to them to be made, desiring by the same petition the same letters patent of the King, to bear date at a certain day limited in the same, the which day is often long before the King's grant to them, made of their said petitions, whereby the King's letters patent to them thereupon made, have borne the same date, by reason whereof divers of the King's liege people, having such offices, farms, and other things, of the gift, or grant of the King, by his gracious letters patent thereof to them long time before duly made, by such subtle imagination of such ante-dates desired by such petitions of such offices, farms, and other things often have been put

poses without consent, together with punishment by imprisonment. The patent reserves power to the Crown for putting an end to the grant should it become inconvenient to the commonwealth.

It is not very clear why this patent was saved from the operation of the Act, seeing that it recites that the invention was for a new manufacture of iron by applying pit-coal in place of wood as the fuel in the making of iron; but it is found that a previous patent had been granted to Simon Sturtevant, in 1612, for thirty years, for making iron with pit-coal, but he failed of success in practice, and surrendered his patent in 1613, to be cancelled. There were also several other patents granted before that to Lord Dudley, for applying pit coal in the smelting of iron ore, but the means taken by the parties failed of success, and the patents had been surrendered. (See "Webster's Reports," and "Notes on Letters Patent," page 16.) Hence a question might have been raised as to whether Lord Dudley was the first inventor, and this probably will account for Lord Dudley's patent being saved from the operation of the statute.—W. C.

THE

REPERTORY

OF

PATENT INVENTIONS.

No. XCIV. NEW SERIES. — OCTOBER, 1841.

Specification of the Patent granted to John Frederick Myers, *formerly of Albermarle Street, now of Charlotte Street, Rathbone Place, both in the County of Middlesex, Musical Instrument Maker, and* Joseph Storer, *of Bidborough Street, New Road, in the same County, Musical Instrument Maker, for certain Improvements in the Construction of certain Musical Instruments, part of the said Improvements being Applicable to those of the kind commonly called Piano-Fortes, and part to those commonly called Seraphines, and to certain Descriptions of Organs.*—Sealed July 20, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, we, the said John Frederick Myers and Joseph Storer, do hereby declare that the nature of the said invention, and the manner in which the same is to be performed, are fully described and ascertained, in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

Our invention relates, first, to a mode of applying the strings of piano-fortes, in order more readily and more accurately to tune the same.

Description of the Drawing.

Fig. 1, represents a front view of so much of an upright piano-forte, as will enable us to describe the nature of this part of the invention.

Fig. 2, is a transverse section of the parts shewn in fig. 1; and,

Fig, 3, is a plan of those parts, such figures being full size; and we would remark, that this part of our invention is equally applicable to grand piano-fortes, as will readily be understood, when the nature of the apparatus is described. *a*, represents a bar of metal, or other suitable material, on which rests the several levers to which the strings are attached. *b*, *b*, being the series of levers, each of which moves on the bar, *a*, as a fulcrum. *c*, is a bar of metal, or other suitable material, affixed by screws, *d*, or other suitable means, to the rest-plank of the instrument; and it will be seen that the levers, *b*, are of two lengths to facilitate the arrangement, each lever having an adjusting-screw passing through the bar, *c*; and by such means the back end of the lever may be depressed to any required extent to obtain the accuracy of tone required: each single string has its particular lever, *b*, and it is made fast to its lever, *b*, by the end being passed through the hole in the projection of the lever, and the string then takes three or four turns around the projection; and in using this arrangement, we employ the old rest or tuning-pin to the other end of the string; hence the string, in the first instance, is drawn tight by means of the old tuning-pin, till the tone is nearly obtained, and then the accuracy of the note will be more conveniently obtained by means of the lever and set-screw. We would remark that it will be seen, that the levers, *b*, each simply rest on the bar or rod, *a*, as a fulcrum; and that is all that

is found necessary. We do not confine ourselves to the precise arrangement shewn and described, provided the means employed be substantively the same as herein described. And we would have it understood, that what we claim as the first part of our invention is the mode herein described of applying strings to piano-fortes to facilitate tuning thereof.

We will now proceed to describe the second part of the invention, which relates to a mode of constructing the vibrating spring-tongues or reeds, and their frames, used in those descriptions of wind musical instruments, called seraphines; that is, such instruments wherein are employed free vibrating spring-tongues or reeds, and which are played by means of finger-keys. According to the ordinary practice of making such descriptions of vibrating spring-tongues or reeds, the tongue and its frame have been distinct and separate parts, and affixed together. Now, the object of this invention is to construct each of such vibrating spring-tongues or reeds and its frame of one piece of metal (preferring steel for that purpose), and giving the required stiffness to the frame by dishing it, as will be hereafter explained.

Fig. 4, shews an inside view, a top view, an edge view, and an end view, of a free vibrating spring-tongue or reed, constructed according to this part of our invention; and we call this class of vibrating spring-tongues or reeds free vibrating tongues or reeds, in contradistinction to the vibrating reeds commonly applied to organ-pipes, where the reed is larger than the opening it covers, whereas in the spring vibrating tongues or reeds of those description of wind musical instruments, called seraphines, the spring-tongue or reed vibrates through and through its opening. The free vibrating spring-tongue or reed and its frame, shewn at fig. 4, is one of the lower bass notes of a seraphine, and in making the upper notes, the size of the vibrating spring and the frame will progressively decrease. In making this description of free vibrating spring and

its frame, it is produced from a portion of thin sheet steel, which is sunk or dished, by means of dies, in a fly-press, as is well understood in pressing metals into shapes by such means; and it will be evident, that by such dishing or sinking of the metal, considerable stiffness will be obtained thereto, notwithstanding the thinness of such metal; and having sunk or dished the frame, as above explained, we next cut the spring-tongue or reed by other dies in a fly-press: but we would remark, that we do not confine ourselves to this mode of making the vibrating tongues and frame, shewn at fig. 4, as they may be sunk by other means, and the tongue cut by other instruments, all which will readily be understood by workmen engaged in shaping and cutting metals for other purposes. The tongue being thus cut, is then filed at its edges, in order to allow of its vibrating through the opening, out of which it is cut, and the correctness of note is obtained by reducing the substance of the spring-tongue by a file or other means; and when this is accomplished, we temper the frame and its spring-tongue to a like temper to that to which the main springs of watches are tempered.

Fig. 5, shews part of the wind-chest of a seraphine with one of our improved construction of free vibrating spring-tongues or reeds, which is retained in its place by the bent stems of the screws, *a*, *a*, as is shewn; and the frame and its spring can readily be removed by turning the stems of the screws, *a*, in an opposite direction to that shewn in the drawing.

Fig. 6, shews a mode of tuning such description of free vibrating spring-tongues or reeds, and consists of a stop which is capable of being slided along the spring-tongue till the desired tone is obtained; and in order to prevent the prejudicial effect of having the spring-tongue to vibrate against metal, we cover the slide with a coating of Indian-rubber, or any other suitable material to damp the effect of the contact. We would remark, that this sliding surface or stop may be varied in its arrangement or con-

struction, but we prefer the one shewn, which consists of the bent stem of a screw, such bent stem lying over and touching the free spring-tongue, and is at all times in contact therewith, but should not press upon it to alter its position in the opening. By this arrangement, it will be evident, that, by turning the stem of the screw in any direction towards either end of the free spring-tongue, as is shewn by dotted lines, the tone thereof will be modified; and we would only further remark, in respect to this part of the invention, that we do not confine ourselves to the sliding stop being the bent stem of a screw, for the surface which rests on the free tongue may be carried by other means, such, for instance, as that resorted to for the reeds of organs. And we would further remark, that we do not confine this part of our invention to the employment of such tuning-stops to free spring-tongues or reeds made according to our invention, as above described, as this mode of tuning is equally applicable to the ordinary free spring-tongues or reeds of such descriptions of wind musical instruments called seraphines. It should be stated, that we have found it desirable, in the upper notes, to fill the frames of the vibrating reeds or tongues with lead, leaving a hole through, of the size of the vibrating spring, reed, or tongue; and we have so filled up the frames of the notes of the upper octave. And we would have it understood, that what we claim as the second part of our invention is, first, the mode of constructing the vibrating spring-tongues or reeds and their frames, as above described; and, secondly, we claim the mode of applying moveable tuning stops to free vibrating spring-tongues or reeds, as above described.

We will now proceed to describe another part of our invention, which relates to the employment of two or more reeds (whether free or organ reeds) in one pipe or chamber, chiefly intended to aid the lower bass notes of organs, though this part of our invention may be used to the higher notes.

Fig. 7, shews a section of parts of three pipes or chambers.

Fig. 8, being a transverse section of fig. 7.

Fig. 9, shews a plan of three free reeds suitable for one of the chambers; and

Fig. 10, shews a plan of the partition in the pipe, with its opening: but we would remark, that we do not confine ourselves to a particular construction of pipe or chamber, and the dotted lines in the transverse section shew a different construction of pipe. By this arrangement we are enabled to save room and expense, and other advantages readily understood by organ makers.

Another part of the invention relates to the application of a peculiar construction of apparatus to the keys of such instruments as have free vibratory spring reeds, in order to couple or combine two or more octaves.

Fig 11, shews a part of a seraphine in section, *a*, being one of the keys, and *b*, the stitcher. *c*, is an axis running in proper bearings at the back of the instrument, and is capable of turning partly round by means of the connecting-rod, *d*, which is attached to a pedal, and moved up and down thereby in such manner as to move the axis, *c*, one quarter round. *e*, is a filling-piece or rod which slides easily through the axis, *c*; and consequently, when the axis, *c*, is in the position shewn in fig. 11, would bring into action the corresponding note one octave higher in the following manner. *f*, is a lever-hinge to the back of the instrument, as is shewn in the drawing. *g*, is a vertical rod, carried by the lever, there being a hole in the lever, *f*, to receive a pin projecting from the lower part of the rod, *g*; and the rod, *g*, has a projecting pin at its upper end, which passes through an arm, *h*, affixed to the axis, *i*, which moves in suitable bearings at the back of the instrument, there being woollen cloth between each of the parts above mentioned, to prevent a jarring noise, and is indicated by the blue tints in the different parts where employed; and the different axes, *i*, are covered

with woollen cloth where they turn in their bearings, so that they may move without noise; and this is shewn in the drawing by pink colour. On each of the axes, *i*, there is a second arm, *j*, projecting, which carries the sticker, b^1, which lifts the stop when actuated: thus, supposing that the key, shewn at fig. 11, was the proper key for the note A, and that the performer, by the pedal, had caused the rod or filling-piece, *e*, to stand vertically between the end of key, *a*, and the lever, *f*, it is evident, that in fingering one key, the note A would be played thereby; and also the note A one octave higher would be played; and it will be evident, that, in like manner, more than two octaves might be coupled together; and it will readily be understood, that the performer, causing the axis, *c*, to revolve or move from its present position, so as to bring the filling-piece or rod, *e*, into a horizontal position, then, in playing with the key, *a*, only one note A would be sounded.

Fig. 12, shews a view of the complete apparatus for coupling two octaves; and it will be seen, that the axis, *c*, has a filling-piece or rod, *e*, for each note, and that each key is provided with corresponding apparatus to what has been described in respect to the key, *a*: consequently, when the axis, *c*, is in the position shewn at fig. 11, the touching of any of the keys will cause, in addition to their own notes, their corresponding notes, an octave higher, to be sounded; and when the axis is turned in a position to bring the filling-pieces, *c*, into a horizontal position, each key, when fingered, will only sound its own note; and it should be understood, that each key has its ordinary stitcker, *b*, as well as the additional stitcker, b^1; and the stitcker, *b*, and b^1, are guided by passing through proper openings, as shewn by dotted lines in fig. 11. In fig. 12, only the parts appertaining to the key, *a*, which sounds the note A, are coloured, by which the arrangement and mode of action will more readily be traced, than if all the similar parts for the

other keys were coloured; but it will readily be traced, that each key has its similar apparatus, and the description given above, of fig. 11, applies to each of the keys; and, therefore, the key, *a*, and parts connected therewith, may be said to represent each and every of the keys and parts connected therewith, excepting that the upright rods, *g*, and the stitckers, b^1, are of different lengths, as is clearly shewn in fig. 12.

Having thus described the nature of this part of the invention, we would have it understood, that we lay no claim to any of the parts separately; but what we claim as that part of the invention, is the mode of coupling two or more octaves, as herein described.

Another part of the invention relates to a mode of constructing the wind-reservoir of bellows employed in seraphines, in such manner as to obtain two distinct weights or pressures of wind from the same bellows.

Fig. 13, shews the section of bellows and wind-reservoir, constructed according to this part of the invention; *a*, *a*, being the induction-valves, and *b*, *b*, the eduction-valves into the wind-reservoir; and it will be seen that the reservoir has two surfaces, *c*, c^1, which act conjointly as one top, which rises and falls with the induction and eduction of air therefrom, or else only the part, c^1, is caused to act, whilst the part, *c*, remains stationary; thus supposing the surface, c^1, to be weighted with half a pound to the square inch of its area, and that the surface, *c*, be weighted with a weight equal to one pound on each square inch of the surface thereof, including the surface, c^1. By this arrangement the wind, so long as the working of the belows was but moderate, would be allowed to flow from the reservoir at a weight of half a pound to the square inch; but in case it was desired to have a greater weight, the surface, c^1, would come under and against the part, *c*, and then they would jointly act as one complete surface, and the wind would pass from the reservoir at a pressure of one pound to the square inch. And it will

be evident that these variations of weight may be changed according to the desire of the performer. And we would remark that although we prefer the surface, c^1, to act within the wind-reservoir, yet it will be evident, that this may be varied and may work outside the wind-reservoir; and in such case would enlarge the wind-reservoir, as is indicated by dotted lines, and in such case the surface, c^1, should be prevented rising too high by cords affixed to it, and to the surface, c, in order to prevent the strain coming too much on the leather, which connects the parts, c, c^1, as is shewn in the drawing.

Fig. 14, shews another arrangement of means for varying the pressure of wind passing from the wind-reservoir, and it consists in having a weight suspended over the wind-reservoir, in order that when it is desired to have a greater weight of wind, the bellows being worked will raise the upper surface, c, of the wind-reservoir up under the weight, and thus bring the suspended weight into action, to give more pressure on the wind-reservoir, and cause the wind to pass therefrom with greater force; and in some cases, in place of having the weight permanently suspended, we have suitable guide pulleys, and the cord to which the weight is suspended in connexion with a pedal, or other convenient means, may be from time to time lowered on to and raised from the wind-reservoir. We would have it understood that what we claim as this part of the invention, is the mode of obtaining two distinct pressures of wind from the wind-reservoir, as described in respect to fig. 13. And, secondly, we claim the mode of using weights, as described in respect to fig. 14.

Another part of the invention relates to a peculiar construction of double acting foot-bellows, which is shewn in section, fig. 15; *a*, *a*, being the frame or box containing the bellows. *b*, is the plunger, which is moved up and down by a treadle, *c*, which is connected to the plunger, *b*, by two connecting-rods or links, *e*, one at each end, as will readily

be understood, on examining this figure of the drawing. The plunger, *b*, is connected to the bottom of the box or frame, *a*, and to the top plate or cover, *f*, by the ordinary means of leather or other suitable material, and the upper plate or cover is, when the bellows is in use, affixed at the upper part of the box or case by the spring, *g*, which is capable of being turned in an opposite direction when the bellows is out of use, and by this means the same may be packed more closely. *h*, *h*, are the two induction-valves, one for the upper and the other for the lower part of the bellows; and *i*, *i*, are the two eduction ways and valves, one for the upper and the other for the under part of the bellowes. And it should be understood that it is the mode of constructing double-acting bellows of musical instruments acting with free reeds, which constitutes this part of the invention; and we would remark, that this figure of the drawing also represents how this construction of bellows may be applied, by a flexible or other tube, to a seraphine, whether the same be temporally or permanently placed or fixed.

Another part of the invention relates to a mode of constructing bellows for seraphines, or instruments working with free reeds, and played by keys, and consists of applying the bellows at the feet of the performer; by this arrangement, the instrument itself will not require to be so large as heretofore, and this arrangement will also offer many advantages to the musical instrument maker, in applying and forming the various parts of the instrument. In carrying this part of the invention into effect, we prefer that the seat or frame thereof should be a long one,—say as long as the instrument is wide, in order to allow of the bellows being as large as possible; and we arrange the bellows of any of the ordinary constructions within such seat or frame of the seat; and we either make the connection of the bellows with the wind-chest of the instrument, by means of a flexible or other

suitable pipe, which may be permanent or otherwise, according to circumstances: and we do not confine ourselves to any peculiar construction of bellows for this part of the invention; but what we claim is the mode of applying bellows for such musical instruments as are played with keys and have free reeds, within or under the seat of the performer, as above described.

Another part of the invention relates to the application of hand-bellows, similar to what are used for the accordion and to small seraphines, and thus producing what may be called hand-seraphines; and the advantages of this combination is in the having the scale of the seraphine, which is similar to the pianoforte, by which a person accustomed to play on either of those instruments, will be enabled readily to play on a hand-seraphine; and in making such hand-seraphine, we prefer to construct each note to speak a sound which ever way the bellows is working, by having two free reeds or vibrating springs to each note, preferring those above described,—one to sound in opening out the bellows, and the other in closing them.

Figs. 16, 17, and 18, shew a plan or front view, and an end view of an instrument constructed according to this part of the invention, and in many respects, it is similar to the accordion, and differs inasmuch as the employment of the scale of keys of the seraphine.

This instrument is suitably arranged for being supported on the knee of the performer, and securely retained thereon, by means of a strap which passes under the foot of the performer. The instrument is placed on the left knee, there being a curved plate, *a*, attached to the under part of the instrument, which may be padded or stuffed, and a strap, *b*, attached at both ends to the under part of the instrument, passed under the foot of the performer; and in playing, the performer actuates the bellows with the left-hand, and performs on the keys with the right-hand. We would remark that we have not thought it necessary to shew the interior construction of this instru-

ment, because the parts are the same as those of a large instrument, excepting being on a smallar scale.

Fig. 19, shews a plan of another arrangement of this instrument, suitable for being placed on a table, with any suitable means of securing the same thereon, in place of having it held on the knee of the performer. *a, a*, is the hand-bellows, which in place of forming part of the instrument, is capable of being separated therefrom by a sliding connection of two plates, *b, c*, one being affixed to the bellows, and the other to one end of the instrument; and these plates go together by a dove-tail slide and groove respectively formed in those plates, *b, c*.

We would remark the arrangement or design of these instruments may be varied; and we would have it understood, that what we claim, is the constructing small seraphines with hand-bellows, as herein described.—In witness whereof, &c.

Enrolled January 20, 1840.

Specification of the Patent granted to Job Cutler, *of Lady Pool Lane, Sparkbrook, in the Parish of Aston, in the County of Warwick, Gentleman, and* Thomas Gregory Hancock, *of Highgate, in the Borough of Birmingham, in the said County of Warwick, Machinist, for an Improved Method of Cutting Corks and Constructing the Necks of Bottles.*—Sealed February 22, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, we, the said Job Cutler and Thomas Gregory Hancock, do hereby declare the nature of our said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the fol-

lowing statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

Our improved method of cutting corks consists of a mode of constructing and applying certain hollow revolving cutters and apparatus to hold the cork when cutting; and in order to give the best information in our power, we will proceed to describe the drawing hereunto annexed, first remarking that the same letters of reference are used to indicate similar parts wherever they occur.

Description of the Drawings.

Fig. 1, represents two cutters in section, mounted or affixed on a spindle, the parts being shewn in section.

Fig. 2, shews a hollow cutter, separately, similar to those shewn in fig. 1. *a*, is the spindle, which has a groove around it, at a^2, by means of which an endless band or cord causes it to revolve, when in use; the necks, a^1, of the spindle, *a*, turning in suitable bearings, as will be hereafter explained, when we come to describe the machinery, which actuates the spindle, *a*. The cutters, *b*, are of tempered steel, and are of a conical or cylindrical figure, to suit the shape of the intended corks to be cut; the outer end of each of the cutters at b^1, being kept sharp, in order to its entering freely into the cork, when the cutter revolves and is pressed against the cork. b^2, is a slit or opening formed in the side of each cutter, the edges of such slit or opening being sharpened, so that, as it revolves against the cork, it cuts away the same to the figure of the interior of the revolving cutter, b, b^1, b^2, the portion of cork cut away from the cork within, passing through the opening of b^2. The revolving hollow cutters, *b*, have each a square hole at the end, which passing on to a square end of the spindle, *a*, having a screw cut thereon, is fastened thereon by a screw nut. *c*, is a rod sliding freely through the spindle, *a*, there being two heads on such rod: the object of this rod is to force out

the cork, which has been produced by one cutter during the time that a cork is being cut at the other end of the spindle by the other cutter; thus supposing a cork has been just cut by the cutter, *b*, b^1, b^2, at the left hand end of the spindle, *a*, the cork would be contained within that cutter, and then supposing the cutter, *b*, b^1, b^2, at the right hand end of the cylinder, were operating or cutting a cork, in proportion as such cutter entered into the cork, the rod *c*, would be forced towards the left hand end of the spindle, and by such means drive out the cork contained in the cutter at that end of the spindle, and so on, first on one end, then on the other, as will readily be traced on examining the drawing.

Fig. 3, shews a front and back end view of the cutter, *b*.

Fig. 4, shews another spindle, *a*, with a somewhat different construction of revolving hollow cutter, *b*; in this case the cutting edge, b^1, being serated, and the slit or opening, b^2, being straight; and it should be stated, that the edges of the serated cutting edge, b^1, are sharpened, so as to represent and act as a series of cutting edges; in other respects the action of the cutter, the spindle, and the sliding rod, *c*, in this case is similar to what has been described in respect to the spindle, *a*, of fig. 1.

Having thus expained the nature of the revolving hollow cutters and parts with which they are combined, we will proceed to explain the means we have pursued for combining a series of such revolving hollow cutters in a machine, and also how the cork to be cut is presented to each of the cutters.

Fig. 5, shews a front view; and

Fig. 6, a side view of a machine, partly in section, in order that the nature of the parts and their modes of action may be more readily traced.

Fig. 7, shews a plan of the bed-plate and series of spindles.

Fig. 8, shews a front view of fig. 7.

Fig. 9, shews an end view of fig. 7.

Fig. 10, shews what we call the cork-holder, shewing the openings through which the revolving hollow cutters enter into the cork-holder.

Fig. 11, shews the end view of a cork-holder, which is at the front of the machine, the dotted lines shewing the top and side thrown open, in the position those parts would be in when putting in cork to be cut.

Fig. 12, shews a plan of a cork-holder open, the surface thereof against which the cutters come when they have penetrated through the cork, being covered with cork or leather, or other material which will resist the pressure of the cork yet not blunt the cutting-edges, *b*[1], of the revolving hollow cutters. The interior of the cork-holders is made with partitions, when the cork is cut up into squares, such as are shewn at fig. 13; but when the cork can be obtained in sufficient size to fill the holder, as shewn at fig. 14, then the partitions, shewn in fig. 12, are dispensed with. *f. f*, shew the framing of the machine; *g*, being the main or driving shaft, which receives motion from a steam-engine or other power, by means of an endless strap working on the pulley, *h*. On the shaft, *g*, is affixed a pulley, *i*, which, by the endless strap or band, *j*, gives motion to the shaft or axis, *k*, there being a pulley, *l*, affixed on that axis on which the endless strap or band, *j*, works. On each of the axes, *g* and *k*, there are drums, *l*[1], which give motion to a series of endless bands or cords, *m*, passing around the spindles, *a*, give motion to those spindles; the upper drum, *l*[1], driving the bands, *m*, of the upper row of spindles, *a*, and the lower drum, *l*[2], driving the bands of the lower row of spindles, *a*. *n*, is the bed plate which carries the cutters. This bed plate is affixed to and carried by the framing, as is clearly shewn in the drawings; *o, o*, being four plates fixed on to the bed plate, in order to offer dove-tailed guides to the dove-tailed slides formed on the quadrangular sliding-frame, *p, p*, such slide-frame carrying the cork holders; and it is by the sliding of the frame, *p*, to and fro, which alter-

nately brings the cutters at the right and left-hand ends of the spindles into action on the cork contained within the cork-holders. *g*, *g*, are the bearings of the spindles, *a*; such bearings being affixed to the bed-plate, *p*, *p*. The sliding-frame, *p*, is moved to and fro by means of a screw, *r*, which turns in bearings, *s*, on the bed-plate, *n*, and the screw passes through projections (at the underside of the frame, *p*,) with female-screws through them; and, by means of the handle, *t*, the workman attending the machine turns the screw, first in one direction, then in the other. *v*, *v*, are the cork-holders, which are affixed on the frame, *p*, by means of the spring-catches, *u*; the dove-tail projections on the underside of the cork-holders sliding in dove-tail grooves formed on the upper surfaces, and at the ends of the frame, *p*: and there are stops at the ends of such dove-tail grooves, to prevent the corkholders being pushed too far; the spring-catches, *w*, as above stated, retaining the cork-holders when once in their places. In order to take out the corks which are cut and to put fresh cork into the cork-holders, the workman removes the screw, and throws back the folding portion of the holder, as above explained, and then removes the corks and places fresh cork therein; the cork-holders are then closed, and the screw-nuts are screwed on to the tops of the pins or screw-bolts, which are affixed to the lower part of the cork-holders, and pass through the opening at the tops thereof, as are clearly shewn in the drawings.

Having thus described the nature of our invention and the manner of performing the same, we would remark that we do not confine ourselves to the particular arrangement of the machine which is shewn and described; nor do we claim the parts separately or combined, other than is herein particularly pointed out and claimed as the invention secured under the present letters patent; and we would have it understood that what we claim, is the mode of constructing and applying revolving hollow-cutters, and the means

of holding corks to be cut thereby, as herein described,—In witness whereof, &c.

Enrolled July 22, 1840.

Specification of the Patent granted to James Ransome *and* Charles May, *of Ipswich, in the County of Suffolk, Machine Makers, for Improvements in the Manufacture of Railway-Chairs, Railway and other Pins or Bolts, and in Wood Fastenings and Tree-Nails.*—Sealed February 15, 1841.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, we, the said James Ransome and Charles May, do hereby declare that the nature of our invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

Our invention relates first, to a mode of casting railway-chairs.

Secondly, to a mode of making railway and other pins or bolts, and wood-fastenings and tree-nails, by forcing them into moulds so formed as to retain them under compression for any required length of time; and by subjecting them to heat when under compression in moulds.

And in order to give the best information in our power, that our invention may be most fully understood and readily carried into effect, we will proceed to describe the drawings hereunto annexed.

Description of the Drawings.

Fig. 1, represents a section of a mould for casting railway-chairs.

Fig. 2, shews one of the patterns separately for forming the mould; these patterns we prefer to be of cast-iron, cast hollow and as light as possible, and the external surfaces made as smooth and equal as conveniently can be.

Fig. 3, shews two side plates or metal surfaces, which form the sides of each of the moulds, between which the core or plug is held when casting; such metal surfaces forming important parts of each mould, as on their use depends, in a great measure, the accuracy of castings produced.

Fig. 4, shews a railway-chair; but we would remark, that the mode of casting railway-chairs is not confined to the shape shewn at fig. 4, as the shape of the chair may be varied by varying the moulds employed, by using suitable patterns and proper side plates and cores, according to our invention.

Fig. 5, shews a core or plug which is of metal; and we prefer to use cast-iron for the side-plates, and also for the cores, though sand-cores may be used, but not with that facility, nor do we find they will generally produce such accuracy. *a*, is the flask or frame in which a sand-mould (for casting two railway-chairs) is made. *b*, is the mould-board; and we prefer to have projections formed thereon, to produce gutters or channels in the sand-mould for the flow of the metal, in place of forming such gutters or channels by hand. *c*, *c*, are two patterns of railway-chairs placed within the flask or frame, *a*; the sides of these patterns are true, so as to receive the side plates, *d*, *e*, one on each side thereof; these side-plates fit close to the pattern, so that no sand will pass between them and the sides of the pattern. Hence, when the patterns are drawn from the mould, the two metal plates, *d*, *e*, will

constitute a portion of the sides of the mould, against which the melted metal will come in casting; a chair and part of the sides of such chair will be formed by such metal side plates, and owing to a core being received between each two metal side-plates, such core will be held most truly, as will readily be understood on examining the drawing aided by the description thereof, given in this our specification.

In the face of the metal-side plate, *d*, is formed a recess, d^1, which receives a projection formed at one end of the core or plug, *f*, which core should be made very accurately at both ends, so that when placed between the two metal side-plates of a mould, the core will be sustained accurately; and in order to prevent the side-plates, *d*, from being forced into the mould, there are formed projections at the back of the side-plate, *d*, which enters a notch, *g*, formed in the flask or frame, *a*, as is clearly shewn in the drawing.

The workman in forming a mould, commences by placing the patterns, *c*, *c*, on to a mould-board, *b*; then he places the side-plates, *d* and *e*, one on each side of each pattern, *c*, *c*. He then places the flask or frame into its place on the mould-board, and the notches or recesses formed on either side of the flask or frame, *a*, pass on to the projection formed on each metal side-plate, *d*. The workman then makes up his mould as usual, by ramming in sand, and having filled the flask or frame, *a*, he places thereon a perforated plate of cast-iron, or a turn-over-board. He then turns the mould over, and he carefully draws the patterns, *c*, *c*, leaving the side-plates, *d*, *e*, in their places at the sides of the moulds. A core, or plug, *f*, is then inserted or placed between each two metal side-plates, *d*, *e*, taking care that the projection, f^1, of the core, correctly enters the groove or recess formed in the side-plate, *d*. The mould is then completed by placing and securing thereon a top part made by ramming sand upon what is technically called an odd side, as is well understood:

such top part we prefer to produce from a pattern surface of cast-iron, or the top part may be of cast-iron. The mould being thus complete, the melted metal is to be poured through suitable gates or holes made through the top part, so as to cause the melted metal to enter into the gutters or channels formed by the projections applied to the mould-board, *b*, as above mentioned.

The castings of the two chairs being thus made, as soon as the metal has become well set, the castings are to be removed from the moulds, and the cores or plugs immediately driven out, which we usually do by means of a hammer, placing each chair on a block of iron formed to the proper figure for supporting a chair, so that the core may be struck through whilst the chair is sustained in such manner that it may not be put out of form, or broken by the force requisite for driving out the core or plug, *f*. It is desirable that the workman should (as nearly as he can judge by careful observation) strike out the core of each chair at the same temperature, otherwise there will be a liability to difference of effects in the shrinking of the different chairs in cooling.

We will now proceed to describe the second part of our invention, which, as above stated, relates to the manufacture of railway and other pins or bolts, and wood fastenings and tree-nails, by forcing them into moulds, and thus retaining them under pressure, and by submitting them to heat when under compression in moulds.

Fig. 6, shews a wooden pin or bolt for fastening railway-chairs to sleepers.

Fig. 7, shews the wood before compression.

Fig. 8, shews a section of a mould and apparatus for compressing the wood. *h*, is a mould in which the wood is compressed. *i*, is the rammer, worked by a suitable press—we prefer to use the hydraulic press, and to have a plate, *j*, fixed on the upper end of the ram or plunger of the press, such plate, *j*, having twelve rammers, *i*, fixed thereon, though the number may be varied. *k*, is a

plate having a series of tubes, *l*, one to each rammer. This plate is capable of being raised or lowered by a screw or other convenient means, in order to facilitate the placing the wood pins, *m*, into the tubes; and having filled the tubes, and placed a mould over each tube (there being a recess in the plate, *k*, to receive the end of each mould), the plate, *k*, is raised, so that the upper ends of the moulds, *h*, may come against the upper surface of the press, *n*. The plate, *j*, is then raised, forcing the wood-pins or bolts, *m*, into the moulds, *h*; and when completely in, the plate, *j*, is to be lowered, and also the plate, *k*, and the moulds, *h*, removed, each containing a wood-pin or bolt; and in order to set the compression obtained, the wood is to be left in the moulds, by which the natural elasticity will be overcome; but we usually submit them to the action of heat whilst under pressure, as it quickens the process; and we prefer, for this purpose, a steam-bath, into which we place the moulds, *h*, for about fifteen minutes; and we use steam of about four pounds pressure on the square inch in the boiler. The moulds are then removed from the heat and allowed to cool, and when cold, the wood-pins or bolts are forced out of the moulds, and it will be found, that such application of heat to wood-pins or bolts, when under compression in moulds, will be most advantageous in the manufacture thereof; and such pins or bolts will be found far superior to those made by simple compression, in which the force cannot be continued. It should be remarked, that, in order to facilitate the forcing of wood into the moulds, we use soft soap to rub the inner surfaces of the moulds, and when larger fastenings of wood are required, we find it desirable to mix a small quantity of black-lead with the soft soap. It should be stated, that there is a small groove at the upper end of each mould, in order to allow the air in the moulds to pass away as the wood is forced in.

Fig. 9, shews a wood fastening for retaining or wedging a rail in a railway-chair. This wood fastening is made

slightly wedged-shaped, as is shewn, and is produced from a parallelogram of wood, such as is shewn at fig. 10; and,

Fig. 11, shews the section of a mould suitable for compressing the same; and the operation of compressing, and also the applying the heat, are to be performed as before described; but, owing to the size of these fastenings, they should remain under the operation of the steam-bath for about thirty minutes, and the fastenings are to be forced out of the moulds when cold. In making tree-nails, they will, generally, either be true cylinders or have a less cone than those of the railway-pins or bolts; they will, however, be compressed in similarly formed moulds. We would remark, that we do not claim the compressing of railway and other pins or bolts, and other wood fastenings and tree-nails, the process of compressing such fastenings having been before practised; this part of our invention simply relating to the forcing them into moulds, in which they can be retained under compression for any length of time; and also the subjecting such wood fastenings to heat when under compression in moulds: and although we prefer the use of a steam-bath for such purpose, we do not confine ourselves thereto: and although we at all times prefer the use of the side plates in casting railway-chairs, yet we do not confine ourselves thereto, provided a metal core be used.

Having thus described the nature of our invention, and the manner of performing the same, we would have it understood that we do not confine ourselves to the precise details as explained, provided the general character of either part of our invention be retained; but what we claim is, first, the mode of casting railway-chairs by means of metal side surfaces in sand-moulds, with metal or other cores, as above described;

Secondly, we claim the mode of casting railway-chairs by applying metal cores, as herein described;

Thirdly, we claim the mode of manufacturing railway

and other pins or bolts and wood fastenings and tree-nails, by forcing them into moulds so formed as to retain them under compression till the elasticity of the wood is sufficiently overcome; and,

Fourthly, we claim the mode of manufacturing railway and other pins or bolts and wood fastenings and tree-nails, by subjecting them to heat when under compression in moulds, as above described.—In witness whereof, &c.

Enrolled August 15, 1841.

Specification of a Patent granted to ANGIER MARCH PERKINS, *of Great Coram Street, in the County of Middlesex, Engineer, for Improvements in the Apparatus for Heating by the Circulation of Hot Water, and for the Construction of Pipes or Tubes for such and other Purposes.*—Sealed January 21, 1841.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye,* that in compliance with the said proviso, I, the said Angier March Perkins, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention relates, first, to a mode of arranging circulating tubes for circulating hot water, whereby the water in circulation is caused to be repeatedly heated before it makes a complete circulation in the apparatus; and,

Secondly, my invention relates to improvements for the construction of pipes or tubes for circulating hot water and other purposes; and in order that my invention may be fully understood and readily carried into effect, I will proceed to describe the means pursued by me in perform-

ing my improvement. The first part of my invention relates to the constructing that description of apparatus for heating by the circulation of hot water, where the heat of the fire or furnace is applied to a portion of the circulating tubes, as is the case according to the invention for which I obtained letters patent, bearing date at Westminster the 30th day of July, 1831; and where the apparatus is closed at all parts, simply having space allowed for the expansion of the water, as was fully described in the specification enrolled to my said patent, and which apparatus is now well known and in extensive use. In constructing such apparatus for heating and circulating water, it has heretofore been usual to cause the water to circulate through the whole length of the tubes of which an apparatus may be composed, before the water is again heated. Now the object of the present improvements, which constitutes the first part of my present invention, is so to arrange the circulating tubes of which an apparatus is composed, that the water having circulated through a portion of the circulating tubes constituting an apparatus, shall then pass to the heat of the fire and circulate through a suitable portion of the tubing placed in the furnace or fire-place, the quantity of tubing in the fire-place depending on the extent of the next portion of the circulation; and the water so re-heated will continue its course through such next portion of the tubing, when the tubing of the apparatus may be so arranged as again to be acted on by the fire, that the water, in continuing its course, may be again re-heated, and proceed through a further continuation through the tubing, and then, supposing there be no requirement for further circulation, the end of the tubing of the apparatus may be connected with the portion of the tubing which is heated by the fire, from which the circulation commenced. By such arrangement, the water will be brought back to the first portion of the apparatus, and will be again heated and recommence its circulation through the same circulation-tubes

through which it had before passed, being again and again heated in its passage from the commencement to the termination of its course, in passing from one end of the apparatus to the other. By this means I am enabled to save many parts of the apparatus, when an extended circulation is required; and the heat of the whole extent of circulation may be kept more uniform in all parts; or particular parts of the circulation may be caused to be more or less hot, according to the proportion of tubing submitted to the action of the fire, when compared with the quantity of tubing constituting the portion of the apparatus through which the hot water is caused to circulate before being again heated; and this arrangement will also be peculiarly applicable, when heating fluids contained in vessels through which the circulating tubes pass, as many joints will be saved in a given length of circulating tubing employed, and the heat of the whole system of pipes within the vessel kept uniformly heated by the repeated heating of the water in its passage from one end to the other of the apparatus; and in order to render this description more clear, I will suppose that it is desired to heat three rooms by one apparatus. According to the present or old construction of apparatus, the tubing through which the circulation would pass, would first go through one room to the extent desired, then pass into another room, and circulate in tubing to the extent desired, then pass into another room to circulate in tubing to the extent desired, and then pass back to the commencement of the tubing acted on by the fire, in order to recommence the circulation, by which mode of arranging the apparatus it will be evident, that the heat of the water will be greatest in the first room, less in the second room, and least in the third room; or else there would require to have three separate apparatus. But according to my present improvements, the circulating tubing would pass from the fire-place or furnace into one room to the extent required; and having done so, the circulating-pipe would pass back to the fire, where a further portion

of it would be submitted to the action of the fire; then the continuation of the same circulating-tube would pass into another room to the extent desired, and then pass back to the fire or furnace, and another portion thereof placed in the fire-place or furnace, and the continuation-tubing would pass into the room to the extent desired, and then the tubing would pass back to the commencing point and be connected therewith, and thus bring back the circulating water to the point from which it started, to be again heated and again circulated through the whole length of tubing of the apparatus, being heated three times in its progress. It will, therefore, be seen, that although the water, according to my present improvements, circulates through the three rooms before it returns to recommence a circulation, in like manner as was first described in respect to the action of the water in the apparatus heretofore in use; yet in the one case there is no re-heating of the water after it has commenced its circulation till its return. In the present invention, the water, as above described, may, in the course of a single circulation, be re-heated as many times as circumstances may require.

I will now proceed to describe the second part of my invention, which, as before stated, relates to improvements for the construction of pipes or tubes for circulating hot water, and other purposes; and such improvements are applicable to the making cast-iron pipes or tubes, whereby they can be more conveniently and securely joined to each other; and in carrying out this part of the invention, the moulds and apparatus employed are so constructed as to produce screw-joints and couplings of peculiar kinds, as will readily be understood by the drawings annexed, aided by the following descriptions thereof.

Description of the Drawing.

Fig. 1, is an outside view; and,

Fig. 2, represents the section of the ends of two pipes,

formed and connected together according to this part of my invention. The pipe or tube, *a*, has a left-hand screw, and pipe or tube, *b*, has a right-hand screw, and the pipe or tube coupling, *c*, has a right and left-hand female screw formed therein; hence, when the screw coupling is turned round by a proper wrench, the two pipes, *a* and *b*, will be drawn together, and a tight joint is made with facility. *d*, is a ring of pasteboard, or other suitable packing, between the ends of the pipes, *a* and *b*. In casting these pipes in iron, to which the invention is confined, the cores used for forming the interior of the pipes will be similar to those ordinarily employed in casting pipe in iron; but the moulds will be formed by patterns, having screws formed thereon, so as to produce a left and a right-handed screw on each pipe; but in making the short pipe or tubular couplings, *c*, the core will have two screws formed thereon, so as to produce the left and right-handed female screws in the casting of iron produced therefrom; and in making such cores, I prefer to use metal moulds formed of three pieces hinged together, and to form in each portion of the mould one-third of the core by ramming and forcing the sand well into the threads or worms of the screws, raising the sand in each portion of the mould to an angle, thus forming three sections of sand, so that when the parts of the mould are closed together, the mould will be filled, and in shutting the parts of the mould together, I enclose a rod of wood in the centre of the mould, such rod of wood projecting beyond the ends of the core, in order, by such means, to support the core in the mould. And I would remark, that great care should be observed by the workman in forming his moulds for the casting the pipes, *a* and *b*, in iron, in order that the screws may be sharp and well formed; and in order to facilitate this process, the patterns should be well formed.

Fig. 3, shews the section of two pipes to be used, to allow of expansion and contraction in parts of the appa-

ratus, which will be rendered the more necessary owing to the joints above described, not allowing of expansion and contraction of the pipes lengthwise, unless the pipes are free to move. *e*, *f*, are the ends of two pipes, the other ends thereof, which are not shewn, being suitable screws to be coupled, as above described. The pipe, *e*, has a socket, within which a female screw is formed by employing a core with a screw formed thereon. The end of the pipe, *f*, is plain, and, in forming a joint, is inserted into the socket of the pipe, *e*, as is shewn. *g*, is a short tube or ring of pasteboard, or other suitable packing. *h*, is a ring of iron. *i*, is a short pipe passing over the pipe, *f*, and entering the socket of the pipe, *e*, there being a screw formed on the short pipe, as is shewn; hence, by screwing the pipe, *i*, into the socket of the pipe, *e*, a screw joint will be produced, and yet allow of expansion and contraction of the pipes, *e* and *f*, and in order to the pipe, *e*, when desired, being laid out of the true line, I form the interior of the tube, *i*, conical on the interior, as shewn. These pipes, *e*, *f*, *i*, are all to be made by casting them in iron, taking care in forming the moulds and cores in such manner as to produce the screws as correct as possible.

Having thus described the nature of my invention, and the manner in which the same is to be performed, I would remark, that I am aware that very similar joints have been made of wrought iron tubing by forming right and left-handed male screws by means of screw tools; and screw-couplings, with right and left-hand screws, formed by screw taps, have been used therewith. I do not, therefore, claim such joints when so formed; and cast-iron pipes may have been formed with screws therein. I wish it, therefore, to be understood, that I do not claim the forming of screws on cast-iron pipes generally, but only when screws of cast-iron pipes or tubes are constructed according to my invention; but what I claim is, first, the mode herein described, of constructing apparatus for circulating hot water by causing the water to be re-

peatedly heated in its course of passing through one circulation

Secondly, I claim the mode of manufacturing joints of cast-iron pipes for circulating hot water and for other purposes, by casting such pipes with left and right-hand screws, and combining therewith screw-couplings with left and right-hand female screws and suitable packings, as above described; and,

Thirdly, I claim the mode of forming the joint described at fig. 3, by casting the parts in iron, as above described.—In witness whereof, &c.

Enrolled July 21, 1841.

Specification of the Patent granted to John Collard Drake, *of Elm Tree Road, St. John's Wood, in the County of Middlesex, Land Surveyor, for Improvements in Scales used in Drawing and Laying Down Plans.*—Sealed February 18, 1841.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said John Collard Drake, do hereby declare that the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

The practice heretofore resorted to in drawing and laying down plans, is to use scales of metal or wood or ivory which are little affected by change of atmosphere, when compared with the paper on which the plans are laid down, such paper being united to linen or calico by means of paste, which not only occasions great extension of the paper from saturation, rendering the paper so united

totally unfit for use until the paste has become dry, but is also greatly subject to alteration from atmospheric changes: the consequences are obvious, the scales of wood or metal or ivory can never agree with the varying material on which maps or drawings are made, by which very serious errors and perplexing difficulties are the result. Now, according to my invention, the scales used are to be made from the paper on which the map or drawing is to be laid down, and the scale so made and used for the purpose of laying down the plan, is, after the plan is made at all times to go with the map or plan, by which means the scale and the plan being of the same materials, and similarly acted on by atmospheric changes, the scale will at all times have the same relation to the plan as when the drawing or plan was first produced from the paper-scale; and by measuring any portion of the plan or map by means of the scale (which has been used in laying down the plan) the quantities indicated will at all times be correct, if the plan has been properly executed in the first instance, notwithstanding any expansion or contraction that may have taken place in the plan and in the scale. And although it is a great improvement on the old mode to make the scale from the paper mounted on linen or cotton by paste; yet in order to obtain the fullest advantage of my invention, I employ Indian-rubber cement in place of paste in mounting the paper on linen or cotton; and in order to accomplish this object, I, as heretofore, evenly stretch the linen or cotton, and then damp one surface of the paper, and on the other surface thereof I apply the Indian-rubber cement (dissolved Indian-rubber) in a thin coat, and as evenly as possible; and I also lay a coat of the Indian-rubber cement on to the linen or cotton, and then spread the paper on to the linen or cotton; by this means it will be found that the paper so mounted will be in a far superior condition for the purposes to which it is to be applied; viz., for laying down maps or plans by means of scales made from the same, than

paper mounted by means of paste. From the paper so prepared, and afterwards joined in such sizes as may be required, I cut a strip of the length and width I desire to have the scale, and I divide it either by hand or otherwise with a series of lines, according to the work to be done, and similar to divisions on scales now in use; but I make no claim for dividing such paper-scales. But as the paper-scale thus produced would not in itself be suitable for use, it is necessary to have a straight-edge or holder when using the scale, in order to hold the scale when required for the purpose of laying down plans, &c.

Description of the Drawing.

Fig. 1, shews a portion of the paper-scale; and,

Fig. 2, shews a portion of a strait-edge or holder, having a portion of a scale applied thereto, so that when the paper-scale and the strait-edge or holder are combined, they form the working scale.

Fig. 3, shews an end view of the straight-edge or holder with the scale therein; and,

Fig. 4, shews an end view of the straight-edge without the scale, the under surface of the straight-edge or holder having a surface of paper on linen or cotton affixed thereon, leaving a space to receive the scale, as is clearly shewn; hence it will be seen, that the paper scale will protrude beyond the straight-edge and the scale by which the work is laid down on the plan at right angles to the straight-edge or holder will not depend on the accuracy of the edge of the paper-scale, but on the accuracy of the straight-edge or holder, and the offset scale, by which portions of the plan are laid down at right angles to the straight edge. The straight-edge (holding the scale) will rest on the surface of the paper-scale when being used, and in order to facilitate the operation of placing the scale, commonly called an offset scale, accurately on the divisions of the paper-scale; I prefer to use the scale fig. 5, the nature of which is clearly shewn in the drawfng, there being a line of wire, or horse-hair, or other fibre, at *a*, *a*, by which

the divisions of the paper-scale may be more correctly worked from the lines, *a, a*, being in fact coincident with, and forming a continuation of, the outer edges of the scale, commonly called an offset-scale, and used for laying down such parts of plans, &c., as are at right angles to the longer-scale, and this will be readily understood, on examining fig. 5.

In using scales according to my invention, the plan or drawing is to be laid down by working from the paper-scale, suitably held in a holder or straight-edge, as described, in conjunction with the offset scale before described; and when the plan is finished, the paper-scale used is to accompany the plan, and should at all times go with it, and whenever it is desired to measure off the quantities of any parts of the plan, the paper-scale being laid thereon will accurately indicate the quantities, notwithstanding any expansion or contraction in the plan, a similar degree of contraction and expansion taking place in the paper-scale also. It will therefore be understood, that according to my invention, the paper for the scale having been cut from the paper on which the plan is to be laid down, the paper-scale is then used for making or laying down the plan, and then accompanies the plan so made, and thus at all times subject to the same effects from atmospheric changes as the plan itself. I would remark, that I am aware that scales have been before made on the paper on which a drawing or plan is made or laid down, but such scale is only used by the aid of compasses, either in laying down the plan or afterwards for measuring off parts thereof, as is well understood; but such scales are wholly unsuited when the scale itself is required as an instrument to lay down plans, to which object my invention is confined. And I am aware that separate paper-scales of paste-board have been before used for drawing purposes. I do not therefore claim the same, and such paste-board scales would not be suitable for carrying out the object of my invention.

Having thus described the nature of my invention, and

the manner of performing the same, I would have it understood, that what I claim as my invention, are the modes herein described, of constructing paper-scales with apparatus for applying the same in drawing and laying down plans, whereby the scales and the plans produced by the aid thereof, will be liable to the same effects of expansion and contraction.—In witness whereof, &c.

Enrolled August 18, 1841.

Specification of the Patent granted to Thomas Clark, *Professor of Chemistry in Marischal College, University of Aberdeen, for a New Mode of Rendering certain Waters (the water of the Thames being amongst the number,) Less Impure and Less Hard, for the Supply and Use of Manufactories, Villages, Towns, and Cities.*—Sealed March 8, 1841.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Thomas Clark, do hereby declare that the nature of the said invention and the manner in which the same is to be performed, are fully described and ascertained in and by the following description thereof (that is to say) :—

My invention relates to a mode of rendering certain waters less impure and less hard by the application of lime, in suitable proportions, as hereinafter explained; and in order that the invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me, and which I have found fully to answer.

As in order to regulate the working of this invention, I prefer to employ certain chemical agents, tests, and standard solutions, I shall, preparatory to giving a particular account of the said invention, begin with

describing the said chemical agents, tests, and standard solutions, and shall afterwards explain the use of the same as applicable to the said invention. I premise, that when I use the word gallon, I mean an imperial gallon; and when I mention a test measure, I mean one-seven-thousandth part of such gallon. By *Test Paper*, I mean reddened litmus paper. I prefer that the acid employed in reddening the litmus be a very diluted nitric acid. I recommend that the said test paper be not so red nor so free from a blueish tint, but that it shall present a distinct red when acted upon by a very dilute solution of un-neutralized alkali or alkaline earth. The said test paper should undergo no similar change on being allowed to remain for half an hour in distilled water. By *Distilled Water*, I mean pure water; and for the better assurance of possessing such water, I recommend that no water be used, as distilled, unless it have been re-distilled at least once, the first eighth part that comes over of the quantity distilled being rejected in each distillation. I employ sixteen *Standard Solutions* for the purpose of ascertaining the degree of hardness of waters by comparison with such standard solutions. The following is the mode of preparing the said sixteen standard solutions, beginning with the strongest. Sixteen grains of pure Iceland spar, otherwise called calcareous spar, being what chemists call a carbonote of lime, are to be put into a Florence flask with a short neck, of about an inch in width. Thereto, pure muriatic acid, of specific gravity approaching to one and a tenth is added. I prefer a muriatic acid of this strength that has been distilled a second time, the first eighth part that comes over of the quantity distilled being rejected in each distillation. A solution of the Iceland spar by the acid will take place with effervescence. The solution, when completed, is to be evaporated cautiously by placing a flask on a heated sand-bath, taking care to avoid too high a temperature, and, as far as possible, to evaporate the matter to dryness without boiling. When the mat-

ter has been thus evaporated to dryness, and while the flask yet remains on the heated sand-bath, the air should be sucked out of the flask by means of a tube, so as to remove any residue of acid fumes. After the flask has cooled, the dry matter is to be moistened with a few drops of distilled water, and again the flask is to be placed on the heated sand-bath, and the matter is to be evaporated, with like precautions as before. The dried mass is then to be dissolved in about a pint of distilled water, and the solution is to be examined by the test paper, which, if the solution be properly prepared, will give neither an acid nor an alkaline indication. The solution is then to be made up, by additional distilled water, to the bulk of precisely one gallon. The solution thus prepared is to be called, and may be labelled, "Standard solution of sixteen degrees of hardness." From the standard solution of sixteen degrees of hardness thus prepared, fifteen other standard solutions are to be made up, with distilled water, as follows:—A glass bottle is to be procured, having an accurately ground glass-stopper, and being in capacity about the sixteenth part of the bulk that is intended to be made of each standard solution. The liquid contents of such a bottle, when the stopper is inserted, is to be taken as a measure. One such measure of the standard solution of sixteen degrees of hardness is to be mixed with fifteen similar measures of distilled water, being, together, sixteen measures; and this mixture is to be called, and may be labelled, "Standard solution of one degree of hardness." In like manner, two such measures of the standard solution of sixteen degrees of hardness are to be mixed with fourteen like measures of distilled water, being together sixteen measures; and this mixture is to be called, and may be labelled, "Standard solution of two degrees of hardness." After a similar manner, standard solutions of respectively 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, degrees of hardness are to be severally prepared, observing that the number of measures of the standard

solution of sixteen degrees of hardness, and of distilled water, when taken together, shall, in each case, be sixteen. By *Soap Test*, I mean a solution prepared from the following materials, and in the following manner:—The materials are two: one material is the soap, commonly called in London white curd-soap,—that is to say, such white hard-soap as, having soda for a basis, is made from tallow, or from tallow chiefly; the second material of the solution is the solvent, which is alcohol, or spirit of wine, diluted with distilled water to the strength of proof spirit. As the quality of white curd-soap somewhat varies, it is necessary, in order to prepare a soap test of nearly a uniform standard, to make a preliminary trial solution on a small scale, for the purpose of ascertaining, by approximation, how much of the soap should be dissolved in the proof spirit. Accordingly, let a small quantity of solution be made by dissolving the soap in proof spirit, in the proportion of one ounce avoirdupois for every gallon of the solution of soap. Now, let 100 test measures of the standard solution of sixteen degrees of hardness be put into a phial capable of holding twice this quantity. Into the water in this phial, let the prepared trial solution of soap be gradually poured from a measure, graduated into test measures; let the mixture be shaken after each addition of the solution of soap, and let the operation be continued in this manner until such time as a lather will be formed of a sufficient consistence to remain for five minutes all over the surface of the water, when the phial is placed on its side. The number of test measures thus required will either be thirty-two, or more or less than thirty-two. If the number prove to be thirty-two, then more solution of soap may be made in the same proportions as in the trial solution, and the solution so made will be the soap test. If the number be more than thirty-two, then proportionably more of the soap must be employed in preparing the soap test. If the number be less than thirty-two, then proportionably less of the soap must be

used in preparing the soap test. But in each case the soap test, after being prepared, should be carefully verified by a trial in the manner described, so as to ascertain whether 100 test measures of the standard solution of sixteen degrees of hardness, will afford a lather with exactly thirty-two test measures of the soap test. If not, an adjustment must be made. Before making such verification and adjustment of the soap test, it will be convenient, in general, to filter the whole solution of soap by filter paper in the usual manner, and also to bear in mind that it is better, before the final adjustment and verification, to have the prepared solution of soap rather too strong of soap than too weak, inasmuch as it is more easy to add thereto an additional quantity of proof spirit than it would be to dissolve therein an additional quantity of the soap. If, in preparing the trial solution of soap in the manner described, the number of test measures, necessary to form the lather, shall exceed forty, the soap should be rejected. I prefer a white curd soap, such as, in the trial solution, forms the lather with less than thirty-five test measures. In preparing large quantities of the soap test, it will be found convenient to scrape off the soap into shavings, by a straight sharp edge of glass, and to dissolve it by heat in part of the proof spirit, mixing the solution thus formed with the rest of the proof spirit. By *Acid Test,* I mean a solution of oxalic acid in distilled water, in such proportion as to contain in every gallon of the solution one avoirdupois ounce and a quarter of the acid, in crystals free from external moisture. The oxalic acid employed should be prepared by crystallizing, for a third time, from solution in distilled water, good commercial crystals of that acid. By *Silver Test,* I mean a solution of nitrate of silver in distilled water: any proportion between 1000 and 4000 grains of nitrate of silver in a gallon of solution, will be convenient. And it should be remarked, that any water whereof 100 test measures require more than three measures of the soap

test for producing the lather herein described, or any water causing a milkiness to appear on having dropped into it the silver test herein mentioned, should be rejected as not distilled water in the sense that has been defined.

By means of the foregoing chemical agents, tests, and standard solutions, three operations of testing are performed. One operation consists in measuring the hardness of any water; a second consists in measuring the alkalinity of any water; the third consists in ascertaining whether there be dissolved in water any caustic alkaline or earthy matter, which caustic matter may be caused, in the working of this invention, by an excess or overdose of lime-water.

In order to measure the hardness of water, I put 100 test measures of the water whose hardness is to be tried, into a suitable phial, and add thereto, with agitation, the soap test measured in test measures, until a lather be produced of sufficient consistence to remain all over the surface of the water for five minutes when the phial is placed on its side. Now, in order to form such a lather, the measured water under trial will take thirty-two test measures of the soap test, or less than thirty-two of such measures, or it will take more than thirty-two. First, I shall advert to the case of the water under trial taking thirty-two, or less than thirty-two test, measures of the soap test, in order to form the lather. If the quantity of soap test required, be exactly thirty-two test measures, which is the same quantity as is required by the standard solution of sixteen degrees of hardness, then the hardness of the water is called sixteen degrees, after the standard solution, with which it corresponds. In like manner, if in order to produce the lather, the water under trial for hardness takes exactly the same proportionof soap test as any other of the standard solutions requires, the hardness will be called after such standard solution. For example, if 100 test measures of the water under trial for hardness, take precisely the same number of test measures

of soap test, as the standard solution of ten degrees of hardness takes, such water would be called ten degrees of hardness. Again, if the water under trial took precisely the same proportion of soap test as the standard solution of eleven degrees is found to take, such water would be called eleven degrees of hardness. But if, to form the lather, 100 test measures of the water under trial require more of the soap test than what is required by the standard solution of ten degrees, and less than what is required by the standard solution of eleven degrees, then the water would be said to be ten and a fraction degrees of hardness, which fraction is to be computed proportionally from the difference in soap test measures required by the solution of eleven degrees, over and above the solution of ten degrees. Thus, in forming the lather, if 100 test measures of the standard solution of eleven degrees were found to take $1\frac{8}{10}$ test measures of soap test more than what 100 test measures of the standard solution of ten degrees would require, and if 100 test measures of the water under trial for hardness require $\frac{9}{10}$ of a test measure over and above what the same standard solution of ten degrees would require, then the water under trial would be said to be $10\frac{5}{10}$ degrees of hardness. This fraction of $\frac{5}{10}$ is obtained by proportion thus :—

$$\overbrace{1\tfrac{8}{10} \quad : \quad \tfrac{9}{10}}^{\text{Differences of soap test.}} \quad :: \quad \overbrace{1 \quad : \quad \tfrac{5}{10}}^{\text{Differences in degrees of hardness.}}$$

Although the standard solution of sixteen degrees of hardness takes thirty-two test measures of the soap test in order to form the lather, as described, which is in the proportion of two test measures for each degree, yet all the other standard solutions require more than two test measures for every degree, and the proportion more increases as the degrees descend. I shall next advert to the case where thirty-two test measures of the soap test do not suffice to produce the lather when added to 100 test mea-

sures of the water under trial. By continuing the first trial farther in such a case, no final result can be obtained, but a preliminary result, necessary in order to prepare for obtaining a final result, may be got by continuing the first trial, in the following manner:—Supposing that thirty-two test measures of the soap test have been added to 100 test measures of the water without producing the lather, the next step of the preliminary trial is to add 100 test measures of distilled water. To the mixture I continue to add soap test as before, until I have added in all sixty test measures of the soap test, provided I have not previously added enough to produce the lather. If at sixty test measures of soap test, or at any number of such measures between thirty-two and sixty, the proper lather be produced, then a final trial may be made in the following manner:—100 test measures of the water under trial for hardness is, at the outset, to be mixed with 100 test measures of distilled water. To this mixture soap test is to be added, until the lather be produced in the same manner as in the case of a water whereof 100 test measures require no more than thirty-two test measures of soap test to form the lather; but the quantity of soap test necessary in the present case will be more than thirty-two and less than sixty-four, at the same time that it will be somewhat more than what was required in the preliminary trial. Whatever the quantity of soap test be within these limits, I divide the number of such test measures by two. The half will not exceed thirty-two, and accordingly may be expressed in a degree of hardness, ascertained by comparison, with the standard solutions, in the manner that has already been described. The double of such degree will be the hardness of the water under trial in this particular case. For instance, if half the soap test that has been required correspond to $10\frac{5}{10}$ degrees of hardness, then the hardness of the water under trial will be 21, being double that of $10\frac{5}{10}$. If again, in the preliminary trial, conducted as has been described,

sixty test measures of the soap test have not sufficed to produce the lather, I thereupon add an additional 100 test measures of distilled water, and continue the preliminary trial, by thereafter adding, as before, soap test, but not beyond ninety test measures, until a proper lather be produced, if producible such a lather be by such quantity of soap test. In the case of such a lather having been produced, I proceed to make a final trial :—I begin by adding to 100 test measures of the water whose hardness is to be tried, 200 test measures of distilled water. To the mixture I add (with agitation) soap test, as before, until the lather is produced. The quantity of soap test thus required is to be divided by three, and the degree of hardness corresponding to the third part is to be ascertained by comparison with the standard solutions, in the manner that has already been described. This degree multiplied by three will be the hardness of the water under trial. In like manner I proceed with water of a higher degree of hardness, by successive additions of 100 test measures of distilled water, and of thirty test measures of soap test, followed by corresponding final trials, and concluded by corresponding calculations.

The second operation of testing consists in measuring the alkalinity of any water. As a preliminary, it is proper to ascertain whether the water be alkaline. For this purpose it is enough to put into a small test glass such as a conical wine glass about twenty test measures of the water to be tried, and place in this water a strip of test paper, in order to observe whether a bluish or purplish tint be produced. When the alkaline matter is in very small proportion some time is necessary in order to produce such alkaline indication ; but if no degree of alkaline indication be produced at the end of half an hour, the alkalinity of the water may be regarded as too inconsiderable for trial. If the water be alkaline enough for trial, a pint of it is to be measured and put into an ample evaporating basin, such as is used by chemists. Thereto is to be added the test

acid, measured in test measures, so long as any alkaline indication is produced by the water on the test paper. On account of the slowness of the alkaline action on the test paper, when the alkaline matter exists in waters in small proportion, the process of neutralizing the alkaline matter in the manner described is somewhat tedious, especially towards the end: the process may be safely hastened by applying heat to the evaporating basin, when nearly the neutralizing quantity of the test acid has been added, and the water may even be made to boil. At the same time care should be taken not finally to adopt any indication of the test paper in the water when it boils, or when it is near the boiling temperature, for, under such circumstances, a fallacious appearance may be produced on the test paper. After the water has been raised to the boiling temperature, the application of heat should be withdrawn during the continuance of the experiment. I recommend as convenient, that in order to observe, as the successive quantities of test-acid are added, whether an alkaline or an acid action prevail, or whether the solution be neutral, that portions of about 20 test measures be put each into a test glass with slips of test paper. The number of test measures ascertained in this manner as necessary, in order to neutralize the alkaline matter, being divided by two, will give the degree of alkalinity of the water under trial. The third operation of testing, consists in ascertaining whether there be dissolved in water any caustic alkaline, or earthy matter. For this purpose, the silver test is employed. The indication by means of this test of the presence of the caustic matter, will be best understood by inspection, and may be judged of by making a mixture of saturated, or nearly saturated, lime-water with distilled water, and also with each of the standard solutions of one degree of hardness, of two such degrees, and of four such degrees, in the proportion of one measure of the lime water to 100 measures, and likewise to 200 measures of each of the others, and adding the

silver test to a test glass of each of these mixtures, and likewise, for the sake of comparison, to a test glass of each of the standard solutions that have been just named, which contain no caustic matter, but which of themselves will occasion a white precipitate to the silver test. A yellowish or brownish yellow appearance may be observed, when the lime-water has been added. Such appearance in waters examined by the silver test, must be observed within the first ten minutes after adding the silver test, for it is well known that, with lapse of time and especially under the action of light, other appearances, such as might mislead, are produced in solutions to which the silver test may have been added.

My said invention being applicable only to certain waters, I proceed to give three indications, whereby the waters alluded to may be recognized and distinguished:—first, the water must indicate an alkaline action by test-paper; second, the water being boiled in a glass vessel for two hours, under arrangements such as allow all of the steam or the most of the steam to condense, and the condensed water to trickle back to the body of the boiling water, will deposit a powder, which will be entirely or almost entirely soluble with effervescence in muriatic-acid; third, the water should be softened by such boiling, to an extent that is material for practical purposes. The degree of softening is to be ascertained by weighing the water, together with the vessel containing it, at the outset, then, after the boiling and subsequent cooling, weighing both again, and replacing with distilled water, any loss of water that may have occurred in the form of steam, and by measuring the hardness both of the water thus boiled and adjusted and of the water in its original state.

My invention in what I regard as its most eligible form of application, consists in mixing lime water (saturated or nearly saturated) in ascertained proportions, and so as to guard against any excess, with the certain waters above

defined, and then, by subsidence, or by subsidence and filtration, to separate the precipitate consequent on the mixture. The general preliminary rule for ascertaining the proportions of the lime water proper to be used with the water intended for purification, is to measure the alkalinity of the lime-water, as well as the alkalinity of the water to be purified, and to use the lime-water and the water to be purified in the inverse proportion of their respective degrees of alkalinity. For example, suppose the alkalinity of lime-water be 175°, and the alkalinity of the water to be purified be $12\frac{1}{2}$°; in this case where the alkalinity of the lime-water is fourteen times the alkalinity of the water to be purified, the lime-water being one measure, the unpurified water should be fourteen measures. But the indication thus derived from the alkalinity, although in general a sufficient guide in determining the proportions of lime-water, and of the water to be purified, should be regarded only as a preliminary indication, and should be confirmed by experimental trials; for instance, in the case supposed, where the proportion of lime-water to the water to be purified is as 1 to 14, it might be proper to make, in glass vessels, five experiments, on a scale where the total of each mixture need not exceed one or two gallons, in the proportions of lime-water to the water to be purified, of 1 to 12, of 1 to 13, of 1 to 14, of 1 to 15, of 1 to 16. As the waters proper to be the subject of this invention vary much in their characters, it will be proper for the operator to observe the characters that manifest themselves in such experiments, in all respects that may serve for his guidance in the working of the said invention, and in particular the peculiarities of the water, as regards the facility or slowness of subsidence in the precipitate that appears after admixture. In such experiments as the foregoing in varied proportions the hardness of each water, after entire subsidence of the precipitate, is to be be tried by means of the soap test, and the presence or absence of caustic

matter, is to be ascertained by the application of the silver-test, in the manner that has been described. Amongst the several proportions used in such trials, the one is to be preferred that gives the least degree of hardness, after entire subsidence of the precipitate consequent on mixture, at the same time that it gives, by the silver-test, no indication of the presence of caustic matter in solution. The alkalinity of the water to be purified, I have stated will, in general, indicate with sufficient accuracy the proportion of lime-water required; and such I have actually found to be the case with river-water, and in some degree with spring-water also; but there are some waters, and more especially some spring-waters, such as would require a larger proportion of lime-water than what would be deduced from their alkalinity. In the case of any such water the proper proportion may be ascertained by experiments on the small scale, such as have been described, if care be taken that the mixtures be so regulated as to increase the proportions of lime-water above what is deducible from the ascertained alkalinity. The particular kind of waters alluded to consist of such as, according to chemists, have a larger proportion of carbonic-acid than would suffice to form alkaline or earthy bicarbonates. If such excess of carbonic-acid is considerable, the proportion of extra lime-water that is required, over and above what is indicated by the alkalinity of the water, may be ascertained approximatively by an experiment, such as the following:—In a series of stoppered bottles, each capable of containing a little more than a quart, let there be put a quart or equal quantities of the water to be purified, and let lime-water, the same as is to be used in purification, be added to each in succession in a series of increasing proportions, such as 10, 20, 30, 40, 50, or more, test-measures, and let the mixture be left for a day in the bottles closed by the stoppers; it will then be seen whether in any, or in which of the bottles the lime-water has been added without pro-

ducing any precipitation. Amongst those bottles that give no precipitate in such experiments, the one that has had the largest proportion of lime-water will give the nearest approximation to the proportion of lime-water that should be used over and above what lime-water is indicated by the alkalinity of the water to be purified. One such mixture where ten test-measures of lime-water has been added, and another where twenty test measures of lime-water has been added, each to a quart of any water, will indicate whether the water be such as to require any extra allowance of lime-water over and above what the alkalinity of the water may indicate. The rules and the precautions that have been given for the regulation of the proportion of the lime-water to the water to be purified, as well as for guarding against any excess of the lime-water are of importance, inasmuch as an excess of lime-water, imparts impurity, and would restore hardness. I wish it not to escape attention, that from these rules and precautions, and more especially from the indications of the tests, the quantity of burnt lime proper for the purification of any water might be apportioned so as to avoid a final excess of lime-water, but I prefer apportioning the lime-water as has been described. When, in accordance with the rules and precautions that have been given, the proportion of lime-water proper to be used in the purification of any given water has been ascertained, the said liquids are to be intimately mixed together in such proportions, and the precipitate thereupon formed is to be allowed to subside. In preparing lime-water for such purpose, I prefer, in the routine of working my invention, to employ such water as has been purified thereby.—In witness whereof, &c.

Enrolled September 8, 1841.

Specification of the Patent granted to GEORGE RICHARDS ELKINGTON *and* HENRY ELKINGTON, *of Birmingham, in the County of Warwick, Gentlemen, for Improvements in Coating, Covering, or Plating certain Metals.*—Sealed March 25, 1840.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, we, the said George Richards Elkington and Henry Elkington, do hereby declare that the nature of our said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof (that is to say) :—

Our invention consists of four parts, and has reference to several distinct operations, processes, or methods, videlicit,

First, a method of covering, coating, or plating copper and brass with silver, by first applying a coating of silver to the surface of the metal to be plated, and afterwards fusing the same thereon, so as to cause the silver to unite and alloy with the surface of the coated metal, in the manner hereafter described.

Secondly, to a method or methods of coating, covering, or plating certain metals with silver, by the use of a solution of silver, and further by the use of a solution of silver in connexion with the application of a galvanic current, as also hereinafter described.

Thirdly, to a method or methods of coating, covering, or plating certain metals with gold, by the use of a certain solution of gold, and further by the use of a solution gold in connexion with the application of a galvanic current, as also hereinafter described.

Fourthly, to a method of preparing iron, so as to render it better fitted for receiving a coating of copper or other metals.

The first branch of our invention, videlicit, the method of coating metal with silver, by fusing the coating surface, is thus performed: The metals to be plated being first rendered perfectly clean, (in the usual manner) are then to be silvered. This may be done by any of the known modes of silvering in use for this purpose, but the method which we prefer and adopt is either that pointed out and described in the specification of a patent granted to Henry Elkington, on the fourth day of December, one thousand eight hundred and thirty-seven; or that hereinafter pointed out in this our specification as the process of coating with silver, without the use of the galvanic battery. Upon the surface thus silvered we apply a hot solution of nitrate of silver, more or less concentrated, according to the thickness of the coating of silver required, which we perform by immersing the metal to be coated in the solution; when this has been effected we submit the metal to a temperature sufficient to expel all the acid, and leave a merely metallic coating of silver. This takes place when the metal is brought to a state a little below red heat, and may be ascertained by observing when the surface of the metal assumes a whitish appearance; the article is then ready for the process of fusion, which we perform in the manner following: Take a sufficient quantity of calcined borax, and put it into a suitable vessel, the vessel which we use for this purpose is of cast-iron made after the shape of a glass maker's pot, and heated by a surrounding flue; in this vessel the borax is to be fused, the temperature being raised until the borax becomes quite fluid, and of sufficient heat to melt silver, which may be ascertained by immersing therein a piece of metal coated with silver. The time required to effect perfect fusion of the silver, will depend partly on the temperatnre of the molten borax, and partly on the nature of the work to be done; if the articles are of thin wrought metal, fusion will take place in from a few seconds to a minute. Care must, however, be taken where the heat

is sufficient for that purpose, that the copper be not in part melted, as will sometimes happen if the article be suffered to remain too long in the flux. On the other hand if the articles are massive, as some heavy cast goods, the time necessary to effect perfect fusion of the silver will be comparatively long; and in these cases care must be taken that every part of the surface is fused, attention being directed in particular to the thicker or more solid parts of the article, which, of course, will be longer in arriving at the necessary degree of heat, and will therefore be the last to fuse. This the workman will readily ascertain, by lifting the work from time to time out of the borax, for if the silver be fused the borax will run off from the metal, and the surface will assume the lustre of melted silver, whereas if it be not perfectly fused the borax will adhere. In practice, we have found it convenient, where the article to be coated is large, to attach to it an iron rod or strong wire, so as to enable the workman to move the article readily, during the process of fusion, and this has the further advantage of causing the silver to flow more equably over the whole surface; but if the articles are small it will be found convenient to put a number of them together into a shallow basket made of strong iron-wire, or of perforated sheet-iron, or, which is still better, of platinum. This may be lifted into or out of the borax by means of a handle or rod attached, and when the work is perfectly fused it may be lifted out therefrom with a pair of light tongs or the like. When the fusion of the silver surface of the article is complete, we cool it either by immersion in cold water, or gradually, by exposure to the air, preferring however the former, and afterwards boil it in dilute sulphuric-acid, (composed of one part acid to twelve parts of water) until the adhering borax is all dissolved. This method of plating is of advantage where hardness is required, as the process of fusion alloys the silver with the surface of the copper, and renders it extremely hard. For a finish to improve

the whiteness of the silver surface the article may be annealed, and boiled in dilute sulphuric-acid or muriatic-acid, as practised by silversmiths; but we prefer to apply a slight coating of pure silver by means of a galvanic current, as hereinafter described in this our specification. Of the metals to be thus coated we have found copper and its alloys with zinc, such as are known in commerce by the terms of gilding metal and good brass, to succeed best. We claim, therefore, in respect of this part of our specification the method of coating copper and its alloys with silver, by the process of fusing silver upon the surface of the coated metal, in the manner above described, whereby the coating of silver is alloyed or united with the surface of the coated metal.

The second branch of our invention, which consists in the coating, covering, or plating of certain metals with silver, by the use of a solution of silver simply, and also by the use of a solution of silver in connexion with the application of a galvanic current, we perform as follows: First, we dissolve oxide of silver in a solution of prussiate of potash (cyanide of potassuim), in the following proportion, or thereabouts, that is to say: To three pounds of prussiate of potash dissolved in two gallons of water, we add five ounces of silver in the state of oxide, and agitate or boil the same until dissolved; the prussiate of soda may be substituted for the prussiate of potash, but the latter is more convenient: The solution thus prepared is then ready for use. The articles to be coated being first rendered perfectly free from scale or grease, (which we effect by the usual process of cleaning metals) are then immersed in the solution. If only a slight covering of silver be required as in ordinary silvering, we prefer to use the solution boiling, and such coating is usually obtained in from a few seconds to a minute; for this degree of coating the application of the galvannic battery is not required. But, secondly, if a thicker coating of silver be desired as in plated wares, we prefer to use the same solu-

tion cold, and obtain a thicker deposit of silver by the application of a galvanic current. The methods of producing and applying galvanic currents are various; the most simple with which we are acquainted is contact with a bar of metallic zinc or other electro-positive metal. A membranous or porous diaphragm may also be used in such a manner, that the solution of silver shall occupy one side, and a dissimilar fluid the other. But we have found that the most efficient and convenient for the purpose above mentioned, are some forms of those used for philosophical purposes, and known by the names of constant or sustaining batteries. That which we prefer and most frequently employ, consists of two concentric cylinders closed at the bottom, the outer one of which is of glazed, and the inner one of unglazed and pourous earthenware. The space between them forms a cell into which is poured a solution of chloride of sodium or other exciting fluid; into this a cylinder of zinc is immersed with a wire of copper soldered to it, and made to bend over and dip into the inner vessel, wherein is contained the solution of silver. The articles to be coated, where they have not already received a first coat of silver, must be carefully cleaned; they are then to be placed in the solution of silver attached to and kept in contact with the wire, and the current being thus established the deposition takes place. The thickness of the coating of silver obtained will depend upon the length of time the metal to be coated is allowed to remain in the solution, and in contact with the wire of the battery; or, where the articles are more than one, with some one which is in immediate contact with the wire, so as to keep up the galvanic communication; it will also vary with the force of the galvanic current, or the force being given with the quantity of work acted upon, and the proportion of silver contained in the solution. The articles during this process generally assume a chrystalline appearance, something like that of matted silver, which chrystallization increases with the thickness

of the silver deposited; if, therefore, we desire to have a bright surface, the articles are afterwards scratched or brushed with wire brushes in the manner well understood, and if a fine dead or matted surface be required, the same may afterwards be obtained by annealing and boiling in dilute sulphuric or muriatic-acid, in the mode well understood. We have found it desirable to add, from time to to time, a fresh supply of oxide of silver, as the solution becomes exhausted by use; and note, that when used in connexion with the galvanic battery, instead of oxide of silver, the chloride cyanide or other insoluble salts of silver (insoluble that is in water) may be employed. We have also sometimes employed a solution of iodide of silver in hydriodate of potash or soda, and occasionally the nitrate oxide or chloride of silver dissolved in pure ammonia; but these we have not found so convenient in practice as the solution of silver in prussiate of potash or soda. And note, further, that other solutions of silver, besides those above particularized, may be employed; such as generally, the ammoniacal solutions of silver, or the solutions of chloride of silver in the muriates of potash or soda. But we have found these combinations difficult in practice, and less successful in their results, and do not recommend them. Moreover, when the galvanic current is to be applied a similar result may be obtained, as follows: let the article or articles to be operated upon receive a first coating of silver, either by the method above described, or by any other of the known processes; and instead of the solution of silver in the prussiate of potash or other salts, as above described, take any simple solution of silver in an acid, so as to constitute what is ordinarily termed a neutral salt: immerse the article or articles in this solution, applying the galvanic current in the manner above described, and the deposit and coating will be effected as before, though not, as far as we have observed, so perfectly.

The above process applies more particularly to the

coating of copper and its alloys, as brass and german-silver; iron may also be coated by the same method, after having first gone through the process of cleansing, hereinafter described. When so prepared it may be at once operated on with a solution of silver and a galvanic current, or may be first coated with copper, and the copper surface be then covered with silver, by the means above described; zinc and tin may also be silvered by the above processes, and the same method is applicable to silver and gold and their alloys. What therefore we claim, in respect of this branch of our invention, is the method of coating the metals above mentioned with silver. First, by the use of an oxide of silver dissolved in prussiate of potash or soda, or other analagous salt or in pure ammonia. Secondly, by the use of a solution of silver in a prussiate of potash, or other analogous salt, or in pure ammonia, in connexion with the application of a galvanic current; and, thirdly, by the use of a solution of silver in an acid, so as to constitute a neutral salt in connexion with the like application of a galvanic current, the article to be operated upon having, in this case, previously received a thin coating of silver, preferring for such first coating the solution of cyanide of silver.

The third branch of our invention which consists, as has been said, in coating, covering, or plating certain metals with gold by the use of a solution of gold simply, and also by the use of a solution of gold in connexion with the application of a galvanic current, we perform as follows: We take oxide of gold prepared by any of the known methods, or metallic gold in fine division, and dissolve the same in a solution of prussiate of potash or soda; to about two ounces of gold converted into oxide we add two pounds of prussiate of potash dissolved in one gallon of water, and boil the same for half and hour: The solution is then ready for use. The articles to be gilt or coated being first cleaned, are to be immersed in the boiling solution of gold, and, where a slight coating only

is required, the gilding is usually effected in from a few seconds to one minute; but if we desire to produce a thick coating of gold, we prefer to use the solution in a cold state, being previously prepared by boiling, and obtain a further deposit, so as to thicken the coating of gold by means of a galvanic current, applied as described in the former part of this our specification, with reference to the coating metals with silver. We prefer to keep the solution as nearly saturated with gold as possible, and for this purpose we keep a portion of oxide of gold or of metallic gold in the solution undissolved. In place of the solution of gold before mentioned, we sometimes employ a solution of the protoxide of gold or purple of cassius in the muriates of potash and soda or other soluble muriates, but not with so good results as the solution of gold in prussiate of potash or soda, hereinbefore mentioned; and generally we find that those salts which combine with gold in a low state of oxidation, and form compound salts having double bases, and which for the most part are found in that class known by chemists, as "haloid salts," as also those which are capable of dissolving gold in the metallic state, as the prussiate of potash are applicable, though with different degrees of excellence in the result, for the purposes of this branch of our invention, and we prefer to employ the solution of oxide of gold in the prussiate of potash, as being the most convenient in practice, the most economical, and producing the best result. As in the process of silvering so in that of gilding, when the metal has received a previous thin coating of gold a simple salt of gold in dilute solution, and in connexion with the galvanic current will produce the effect, though not, so far as we have observed, so well or perfectly. The metals to which this branch of our invention applies, are the same as those before enumerated as capable of being silvered. We claim, therefore, in respect of this branch of our invention the method of coating, covering, or plating the metals above mentioned with gold, by the use,

first, of an oxide of gold or metallic gold in fine division dissolved in prussiate of potash or any soluble prussiate, and by the use of oxide of gold dissolved in any other analagous salt; and, secondly, by combining the action of a galvanic current with the use of a solution of gold, as above described, giving the preference to a solution of gold in the prussiate of potash, as above particularly described. And further, with reference to the two last mentioned branches of our invention, we claim the application of a galvanic current in connexion with solutions of gold or silver, as above described, for the purpose of coating, covering, or plating metals with gold or silver, whether the articles to be so coated consist wholly of metal, or the metal forms merely a coating or surface to some other substance of which the article generally is composed.

The fourth branch of our invention relates to the preparation of iron. In order efficiently to coat iron with copper and other metals, we have found it necessary to prepare or cleanse the surface by a process, the effect of which is to make and keep the iron in an electro-negative state, during the period of the action of the cleaning acid upon it, and the process which we employ for that purpose, is the following: we take dilute acid by preference, the sulphuric-acid composed of one part of acid and sixteen parts of water. The iron articles to be cleaned are immersed into this solution, being previously brought into connexion with a wire, to which a piece of zinc is soldered. In from five to fifteen minutes, more or less, the black scale of oxide will be found to be loosened and detached from the iron, leaving the surface bright and metallic; instead of the wire a vessel may be used, into which the iron and diluted acid may be put, with a slip of sheet-zinc bending over and dipping into the solution, and for practical purposes we prefer a wire-basket or vessel of brass, but as the object is to render the iron electro-negative, with respect to the zinc, a wire or vessel of any metal, not actively attacked by the acid, may be

used. When the iron articles are thus prepared, we remove them direct into another brass vessel containing sulphate of copper in solution, and having that salt in excess, and also a small proportion of the dilute-acid, above described; we take to one pound of sulphate of copper, three pounds of water and two ounces of the dilute-acid, and we find it necessary occasionally to add further portions of the acid, while the solution is in use. We keep the articles a few seconds in this vessel, stirring or moving them, and taking care that some part communicates with the vessel. By these means they will be found in a few seconds to be firmly coated with a thin film of copper, and in a proper state to be placed in contact with a galvanic current so as to obtain a further deposition of copper, as may be required; which latter process we perform by means of a galvanic arrangement, like that described in this our specification for coating metals with silver. And we would remark that iron so cleansed may be coated with other metals by galvanic currents, or the iron so cleansed may be coated by other known means. We do not claim in respect of this branch of our invention, the use of the galvanic current for the purpose of depositing copper on surfaces of iron generally, such process being known; but what we do claim is an improved method of coating iron with other metals, by the employment of the above described mode of cleaning the iron, as a preparatory process for such coating.—In witness whereof, &c.

Enrolled September 25, 1840.

Specification of the Patent granted to DOWNES EDWARDS, *of Surbiton Hill, Kingston, in the County of Surrey, Farmer, for Improvements in Preserving Potatoes and other Vegetable Substances.*—Sealed August 8, 1840.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Downes Edwards, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof (that is to say):—

My invention relates to a mode of preserving potatoes in a cooked, or partially cooked, state, by means of obtaining the substance of potatoes in a separated or finely divided and dried state. And, in order to give the best information in my power, I will proceed to describe the means pursued by me in carrying out my invention, and which I have found fully to answer. The potatoes are first well washed and cleansed from the dirt, and then boiled or steamed till the skins just shew symptoms of cracking; they are then peeled, or stripped of their skins, and the eyes or specks are carefully taken out. The potatoes are then put into a cylinder, which I make of iron-plate, tinned on the inner surface, such cylinder being closely pierced with small holes about $\frac{1}{8}$th of an inch in diameter; and by the action of a powerful screw, or other proper press, a piston is caused to pass down in the cylinder, and the potatoes are caused to pass out through the holes in the form of small threads or fibres, which retain the form in which they pass from the cylinder. The substance of potatoes thus separated is then spread evenly and thinly on hollow tables, which I make of tinned-iron, and heat the same by steam to a varying temperature of from 100 to 160 degrees of Fahrenheit, the lower temperature being applied as the substance of potatoes approaches a state of dryness. This variation in the tem-

perature of the tables I obtain by regulating the supply-cocks that connect each table with the main or supply-pipe from the boiler, the steam in the boiler being at a pressure of about 10 lbs. to the square inch; thus by increasing or diminishing the quantity of steam in each table, I obtain the desired heat. During the time the potatoe is on the tables, it is constantly raked and moved about till it is thoroughly dried; and it may, immediately after getting cold, be packed in casks or otherwise.

Having thus described the nature of my invention, and the best manner I am at present acquainted with for preparing the same, I would have it understood that I make no claim to any of the apparatus herein described; nor do I confine myself thereto, though I consider the means above described the most simple and best for performing the invention; but what I claim as my invention is the mode of preserving potatoes in a cooked, or partially cooked state, by means of obtaining the substance of potatoes in a separated or finely divided and dried state, as described. —In witness whereof, &c.

Enrolled February 8, 1840.

NOTICE OF EXPIRED PATENTS.

(*Continued from page* 124.)

JOSEPH ROBINSON, of Merchant's Row, Limehouse, Middlesex, Brush Maker, for an improvement in the manufacture of brushes of certain descriptions, and in the manufacture of a material or materials, and the application thereof, to the manufacture of brushes and other purposes.—Sealed December 4, 1827.

PAUL STEENSTRUP, of Basing Lane, London, Esquire, for improvements in machinery for propelling vessels, which improvements are applicable to other purposes.—Sealed December 11, 1827. —(*For account of specification, see Repertory, Vol.* 8, *third series, p.* 349.)

JOHN HARVEY SADLER, of Hoxton, Middlesex, Merchant, for improvements on power looms for the weaving of silk, cotton, linen, wool, flax, and hemp, and all mixtures thereof.—Sealed December 13, 1827.

Ralph Rewcastle, of Newcastle-upon-Tyne, Millwright, for a new and improved method of ballasting ships or vessels.—Sealed December 13, 1827.—(*For account of specification, see Repertory, Vol. 7, third series, p. 333.*)

Robert Stein, of Regent Street, Gentleman, for an improvement in applying heat to the purpose of distillation.—Sealed December 13, 1827.

Frederick Benjamin Geitlen, of Birmingham, Brass Founder, for improvements on castors for furniture and other useful purposes. —Sealed December 13, 1827.—(*For account of specification, see Repertory, Vol. 8, third series, p. 79.*)

Henry Peto, of Little Britain, London, Surveyor and Builder, for an apparatus for generating power.—Sealed December 13, 1827.

Joseph Anthony Berrollas, of Nelson Street, City Road, Middlesex, Watch Manufacturer, for a method of winding up a pocket-watch or clock without a key, which he calls "Berrollas's keyless watch or clock," and also a certain improvement to be applied to his late invented detached alarum watch.—Sealed December 13, 1827.—(*For copy of specification, see Repertory, Vol. 8, third series, p. 1.*)

Andrew Motz Skene, of Jermyn Street, Middlesex, Esquire, a Lieutenant in the Royal Navy, for an improvement or improvements in the mode of propelling vessels through the water, and for working under shot water-mills.—Sealed December 13, 1827.

John Lee Stevens, of Plymouth, Merchant, for a new or improved method or methods of propelling vessels through or on the water by the aid of steam or other means or power, and for its application to other purposes.—Sealed December 18, 1827.—(*For copy of specification, see Repertory, Vol. 7, third series, p. 71.*)

(*To be continued.*)

LIST OF NEW PATENTS.

Richard Whitaker, of Cambridge, Machinist, for improvements in cutting the edges of books and paper, and for other purposes, and in impressing ornaments, letters, and figures on the binding of books and other surfaces.—Sealed September 4, 1841.—(*Six months.*)

Theophile Anton Wilhelme, Count of Hompesch, of Mivart's Hotel, Brook Street, for improvements in ob-

taining oils and other products from bituminous matters, and in purifying and rectifying oils obtained from such matters.—Sealed September 4, 1841.—(*Six months.*)

John Boot, of Quarndon, Leicester, Lace Glove Manufacturer, and John King, of Henor, Lace Maker, for certain improvements in machinery or apparatus for manufacturing or producing figured or ornamental fabrics in warp and bobbin-net-lace machines.—Sealed September 4, 1841.—(*Six months.*)

John Grafton, of Cambridge, Civil Engineer, for an improved method of manufacturing gas.—Sealed September 4, 1841.—(*Two months.*)

Michael Coupland, of Pond Yard, Southwark, Millwright and Engineer, for improvements in furnaces.—Sealed September 4, 1841.—(*Six months.*)

George Wildes, of Coleman Street, Merchant, for improvements in the manufacture of white lead. Communicated by a foreigner residing abroad.—Sealed September 4, 1841.—(*Six months.*)

William Hill Darker, Senior, and William Hill Darker, Junior, both of Lambeth, Engineers, and William Wood, of Wilton, Carpet Manufacturer, for certain improvements in looms for weaving.—Sealed September 4, 1841.—(*Six months.*)

Louis Lachenal, of Titchfield Street, Soho, Mechanic, and Antoine Vieyres, of 40, Pall Mall, Watch Maker, for improvements in machinery for cutting cork.—Sealed September 4, 1841.—(*Six months.*)

John Juckes, of Lewisham, Gentleman, for improvements in furnaces or fire-places.—Sealed September 4, 1841.—(*Six months.*)

Pierre Pelletan, of Saint Paul's Church Yard, Professor of Medicine, for improvements in propelling fluids and vessels.—Sealed September 6, 1841.—(*Six months.*)

Thomas Drew, the Younger, of St. Peter's Port, for an improved method of rolling and cutting lozenges, and also of cutting gun wads, wafers, and all other similar

substances, by means of a certain machine designed by him, and constructed by divers metals and woods.—Sealed September 6, 1841.—(*Six months.*)

Luke Hebert, of 12, Staple's Inn, London, for certain improvements in the apparatus and metals used in the manufacture of gas for illumination, and in the apparatus for burning the same.—Sealed September 8, 1841.—(*Six months.*)

Richard Else, of Gray's Inn, Esquire, for certain improvements in machinery or apparatus for forcing and raising water and other fluids.—Sealed September 8, 1841.—(*Six months.*)

William Fairbairn, of Millwall, Poplar, Engineer, for certain improvements in the construction and arrangement of steam-engines.—Sealed September 8, 1841.—(*Six months.*)

Joseph Cooke Grant, of Stamford, Lincoln, Ironmonger and Agricultural Implement Maker, for improvements in horse-rakes and hoes.—Sealed September 8, 1841.—(*Six months.*)

Nathaniel Card, of Manchester, Candle Wick Maker, for certain improvements in the manufacture of wicks for candles, lamps, or other similar purposes, and in the apparatus connected therewith.—Sealed September 8, 1841.—(*Six months.*)

James Thorburn, of Manchester, Machinist, for certain improvements in machinery for producing knitted fabrics.—Sealed September 8, 1841.—(*Six months.*)

Miles Berry, of Chancery Lane, Civil Engineer, for an improved method or means of, and apparatus for, cleansing typographical characters, or forms of type, after being used in printing. Communicated by a foreigner residing abroad.—Sealed September 8, 1841.—(*Six months.*)

Oglethorpe Wakelin Barratt, of Birmingham, Metal Gilder, for certain improvements in the precipitation or deposition of metals.—Sealed September, 8, 1841.—(*Six months.*)

Joseph Garnett, of Haslingden, Dyer, and John Mason, of Rochdale, Machine Maker, for certain improvements in machinery or apparatus employed in the manufacture of yarns and cloth, and are also in possession of certain improvements applicable to the same. Partly communicated by a foreigner residing abroad.—Sealed September 8, 1841.—(*Six months.*)

Edward Loos de Schelesdatt, Engineer and Chemist, and Etienne Sterlingne, Tanner, of Regent's Square, in the county of Middlesex, for certain or new improved machinery or apparatus and process for tanning skins or hides, and preparing or operating upon vegetable and other substances.—Sealed September 8, 1841.—(*Six months.*)

George Mannering, of Dover, Plumber, and Henry Harrison, of Ashford, Plumber, for certain improvements in the means of raising water and other liquids.—Sealed September 8, 1841.—(*Six months.*)

Alphonse Rene Le Mire de Normandy, of Red Cross Square, Cripplegate, Doctor of Medicine, for certain improvements in the manufacture of soap.—Sealed September 8, 1841.—(*Six months.*)

William Crosskill, of Beverley, Iron Founder and Engineer, for improvements in machinery for rolling and cutting land, and in machinery to be used in the culture of grass land.—Sealed September 8, 1841.—(*Six months.*)

William Hickling Burnett, of Ravensbourne Wood Mills, Deptford Creek, Gentleman, for improvements in machinery for cutting wood, and in apparatus connected therewith, part of which may be applied to other purposes.—Sealed September 9, 1841.—(*Six months.*)

Charles Louis Stanislas Baron Heurteloup, of Albany Street, Regent's Park, for an improved manufacture of continuous priming, and for an improved mechanism for the application of the same, to certain descriptions of firearms.—Sealed September 9, 1841.—(*Six months.*)

Conrad Frederick Stollmeyer, of Golden Terrace,

Barnsbury Road, Islington, Merchant, for certain improvements in obtaining and applying motive power, by means of winds and waves, for propelling vessels on water, and driving other machinery.—Sealed September 17, 1841.—(*Six Months.*)

George Shillibeer, of Melton Street, Euston Square, Carriage Builder, for improvements in the construction of hearses, mourning, and other carriages.—Sealed September 20, 1841.—(*Six months.*)

Francois Marie Agathe Dez Maurel, of Newington Terrace, Surrey, for an improved buckle. Communicated by a foreigner residing abroad.—Sealed September 20, 1841.—(*Six months.*)

William Charlton Forster, of Bartholomew Close, Gentleman, for a material, or compound of material, not hitherto so used, for preventing damp rising in walls, and for freeing walls from damp, which material, or compound of material, can be applied to other purposes.—Sealed September 20, 1841.—(*Six months.*)

William Newton, of Chancery Lane, Civil Engineer, for improved machinery for manufacturing felts or felted cloths. Communicated by a foreigner residing abroad.—Sealed September 20, 1841.—(*Six months.*)

Joseph Hulme, of Manchester, Engineer, for certain improvements in machinery or apparatus for grinding, sharpening, or setting the teeth or cards or other similar apparatus employed for carding or operating upon cotton, wool, or other fibrous substances.—Sealed September 20, 1841.—(*Six months.*)

Thomas Huckvale, of Over Norton, Oxford, Farmer, for improvements in horse-hoes, and in apparatus for treating and dressing turnips to preserve them from insects and promote their growth.—Sealed September 20, 1841.—(*Six months.*)

Alfred Elam, of Huddersfield, in the county of York, Surgical Instrument Maker, for improvements in appa-

ratus or instruments for the relief and cure of procedencia and prolapsus uteri.– Sealed September 20, 1841.—(*Six months.*)

Luke Hebert, of Birmingham, for improvements in machinery for fulling woollen cloth. Communicated by a foreigner residing abroad.—Sealed September 20, 1841.—(*Six months.*)

William Bush, of Deptford, Engineer, for improvements in the means of, and in the apparatus for, building and working under water.—Sealed September 21, 1841.—(*Six months.*)

Comte Melano de Calcina, of Nassau Street, Middlesex, for improvements in paving or covering roads and other ways or surfaces.—Sealed September 21, 1841.—(*Six months.*)

Edward Emanuel Perkins, of Westow Hill, Norwood, Gentleman, for improvements in the manufacture of soap.—Sealed September 21, 1841.—(*Six months.*)

John Duncan, of Great George Street, Westminster, Gentleman, for improvements in machinery for driving piles.—Sealed September 21, 1841.—(*Six months.*)

George Scott, of Louth, Miller, for certain improvements in flour-mills.—Sealed September 23, 1841.—(*Six months.*)

James Whitelaw, Engineer, of Glasgow, and James Stirrat, Manufacturer, of Paisley, for improvements in rotary machines to be worked by water.—Sealed September 23, 1841.—(*Six months.*)

Henry Bessemer, of Baxter House, Saint Pancras, Engineer, and Charles Lanis Schanberg, of Sidmouth Place, Gray's Inn Lane Road, Artist, for improvements in the manufacture of certain glass.—Sealed September 23, 1841.—(*Six months.*)

THE

REPERTORY

OF

PATENT INVENTIONS.

No. XCV. NEW SERIES.—NOVEMBER, 1841.

Specification of the Patent granted to Moses Poole, *of Lincoln's Inn, in the County of Middlesex, Gentleman, for Improvements in Tanning and Dressing or Currying of Skins.*—Sealed February 22, 1841.

WITH AN ENGRAVING

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Moses Poole, do hereby declare the nature of the said invention, and the manner in which the same is to be performed, is particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

The nature of the invention for tanning or currying and dressing skins is for the employment of machinery afterwards described, for the purpose of removing the hair from the skins without the aid of acid or alkalies, and for softening the skins, in order to render them more suitable to receive the tanning matter; and in the arrangement of machinery for cutting the skins, by which I am enabled to obtain an uniform thickness, which is of great importance in tanning the skins in a regular manner,—(this part of the

operation has been done heretofore by hand); and also in an arrangement of machinery for currying and dressing skins, as will be hereafter described. The means and objects of the present patent rest upon different principles. I have arranged them, to explain the mode of producing the four following effects:—First, not altering the skins by any chemical re-action.

Second. preparing the skin by mechanical means, so as to render it more fit to receive the tanning material.

Third, to reduce the labour.

Fourth, a mode of currying or dressing the skins by mechanical means.

The first operation is by preparing the skin to be tanned by soaking it in the green or fresh state for some hours, when it is submitted to the action which will be afterwards described. The skins, when dried, are treated in the following manner:—After they have been well tempered for some time. generally about forty-eight hours, I place them in what I call a falling-machine, which is shewn in the drawing at fig. 1; and they are subjected to the action of rammers for about an hour. By the repeated blows which they receive from these rammers, the skins are softened and brought into a fit state to have the hair removed; they are then taken to another apparatus, which is shewn in the drawing, fig. 2, to the action of which they are submitted for some time. Steam is admitted into this vessel to raise the temperature about forty or forty-five degrees Fahrenheit; the skins are then removed into another vessel, which may be of wood, or any other suitable material, where they are subject to the action of luke-warm water running through them for the space of about twenty-four hours. Care should be observed with regard to the temperature, otherwise, should the action of removing the hair be carried on better on one side of the skin than on the other, you run the risk of making the skin hollow, and of injuring the quality. A workman by practice can, with his hand, ascertain the proper

degree of temperature; but it can always be ascertained by the use of the thermometer. To operate upon a small quantity of skins at one time, no further preparation would be necessary to remove the hair; but when working upon a large scale, it is necessary to act upon them more quickly. I use lime-water in place of the milk of lime, which is ordinarily used for soaking the skins; the temperature of which should be regulated by the quantity of skin to be operated upon at one time. After these operations have been completed, the hair may be removed from the skins with the greatest facility. The skins are then subject to the action of cutting and paring by a machine which is shewn in the drawing, figs. 4 and 5. The machine, regulated by the workman, acts upon the skin in the manner required, and removes all the parts of flesh which adhere to the skin, and fits it for the future operations which it has to undergo. The advantage of this mode of preparing the skin is, that only that part of the skin is prepared for tanning, which is rendered available, whereas in the old plan, the whole of the skin is tanned, and has afterwards to be pared, which produces much waste of tanning matter. The parts of the skin which are cut off in this state may be used in the manufacture of glue, and such like matter. The skins thus prepared are placed in the fulling apparatus, and worked in lukewarm water for some time, according to the nature of the skins; they are then placed in the vessel shewn at fig. 2, to saturate them in a weak quantity of tanning matter for several hours, they are then removed and piled up; about two hours after that I place them in a stronger quantity of tanning matter. The three first days they are removed three times a day, afterwards once every day; they are fulled every forty-eight hours, and placed into the other vessel for half an hour in the same tanning matter, and then afterwards remain until they are sufficiently saturated. The action of the rammers in the fulling machine softens the skins, and renders them more suitable to re-

ceive the tanning matter; and by the use of the vessel at fig. 2, I am enabled to bring every part of the skin in contact with the tanning matter, which acts upon it in a rapid and uniform state: the time also in which this operation is performed, is considerably shorter than the old plan. Another mode of operating upon the skins is as follows: The skins being placed in the vessel for removing the hair, previously described, a quantity of steam is forced in to raise the temperature of the liquid to about forty or forty-five degrees. By the rotatory movement of this vessel, the skins are thrown against the sides and fall to the bottom, and are again raised: this action is continued for some time, until the skins have lost some portion of their hair. They are then placed in a vessel, shewn in the drawings, figs. 6, 7, 8, to which motion may be communicated by any suitable power. This vessel has a series of pegs or pins fixed thereon, and it is placed in the water as far up as the half of these pegs. The skins, which project over these pegs, have their hair removed by the rotatory motion of the vessel, and the hair falls to the bottom of the vessel. There is a metallic grating which prevents the skin from falling out of the vessel. The skin may now be cut and submitted to the different operations previously described.

I will describe the improvements which relate to currying or dressing the skins. After the skins have been tanned by the process which has been previously described, or by any other process, they are plastered over with fatty matter, composed of oil and tallow. The skins thus greased are placed in a cylinder, having a series of pegs or pins placed in the inner surface of it, in a similar manner to the one previously described. This cylinder is made to revolve, and the skins are forced against the pegs in its rotation. This action is to be kept up for about half an hour, when the fatty matter will be found to have penetrated into the skin, and the surface will present a perfectly dry appearance; they are then to be withdrawn

and stretched and dried, and further prepared by the ordinary means. Although I have described the use of this cylinder or drum in the currying or dressing skins, in connection with my system of tanning, yet it is not absolutely necessary to be used, as the system of tanning prepares the skins to receive better the greasy matters; but in many cases it will be found advantageous to use the system above described. I have shewn in the drawing a press for pressing the skins; but I do not confine myself to that, as any other suitable means of acting upon the suitable cutters may be employed. Another part of this system consits in cutting the skins to suitable sizes, to render them more convenient for the sale of the different products. This is ordinarily effected by placing on the skin a model of the size or form required, and afterwards cutting the skin to it. This is usually a long operation, and is not done so correctly as is required. I have endeavoured to arrange a system which will be found to be more exact and more expeditious. It consists of the use of a strong plate of the required form, having around it a cutting-blade of steel, which levels the plate on one side, and raises the cutting blade rather above the surface of this same plate: by this arrangement the work is much more regular and exact, and more easily executed, than when done by hand; besides which, I am enabled to operate upon a larger number of skins. The skins, although submitted to the operation of paring, and consequently having their thicknesses nearly equalized, present sometimes some slight inequalities which are injurious; these have to be planed off by a very small cutter: this operation is performed after the skins have been cut and bent into the form required by the party who is to use the skin; and it is done by placing it on a table, and retaining it there by a sort of nipper, which is pressed upon the skin by the workman; to keep up the necessary pressure to retain the skin in its place, hinders the workman in performing this part of his work. I have arranged a simple system to obviate

this: I use a nipper or holder, somewhat of the form of a pruning-hook, placed at the side of the table, attached to an upright bar, which slides in a groove made in the framing fixed to the side of the table: in the lower part of this nipper is a notch, in which is placed a lever, having a weight attached to its end; the weight acting upon the lever draws it down, and consequently forces the nippers on to the table, and retains the skin in the required position. To relieve this lever when it is required, there is placed upon the right side of the frame another lever, which acts against a peg placed in the lower part of the nippers. This lever acting against the pin raises the bar, which slides in a groove, and consequently the nipper above the table, and allows the workman to remove it or not as may be required.

Description of the Drawing, Figure 1.

A, B, are the wheels which communicate the motion to the machine and to the axis, O, upon which are placed the rammers, E, E, E. F, is a moveable case into which are placed the skins. C, C, are cocks for the purpose of clearing out the case. H, are the doors in the machine through which the skins are placed in the case, F. I, is the wheel-work which moves the cases, F.

Description of Figures 2 and 3,

Which may be an open vessel; but I prefer to have it closed, as the temperature may be the better kept up; but I do not confine myself to the use of close vessels. A, is the vessel closed by a cover. B, the axle, which carries the rammers. D, D, D, D, are the tubes, through which the steam, hot, and cold water, and the tanning matters, are introduced. E, is the ladder for the workman to go down to regulate the cocks. F, is the level of the ground. G, is the level of the water in the vessel. H, is the opening in the vessel. *a*, is the wheel which communicates motion to the machine taking into the wheel, *b*. The form of the rammers may be varied; but I prefer to use them straight.

Description of Figures 4 *and* 5,

Represent the machine for paring the skins, to which they are to be brought, after they have been previously prepared by tempering and softening. This machine is composed of two cylinders of copper, or other suitable material, A, B, mounted upon a frame, C, and forming a kind of presser. The upper cylinder, A, is raised and lowered by means of two screws, D, D, placed in the upper cross part of the framing, and acting upon the supports, H, fixed to the sides of the framing. At the end of this axis there is a small fly-wheel, I, by means of which the screws, F, F, are turned; these, in turning, give movement to the wheel, E, which turns the screws, D. These screws carry immediately below the wheel, E, two collars, in which rests a bar, *k*, which has affixed to its two ends two brackets, L, into which passes the axis of the cylinder, A, and rises and falls with them. The action is that of a presser. At the two ends of each cylinder are fixed toothed-wheels of different diameters, M, N, M^1, N^1. Those which are placed upon the axis of the lower cylinder, B, are moveable, and run on this axis, in order that they may be moved from left to right, by means of two forked pieces, O, fixed to the ends of a bar, P^{111}, which is placed across the machine. These wheels are moveable according to the length of the axis, and are fixed by means of a sliding bar fixed on the same axis, in order that they may not turn without moving the cylinder in their rotation; the two wheels, M, M, taking into each other, when the cylinders are apart the one from the other, and the wheels, N, N, when they are brought together, in order that in these two positions the cylinders turn simultaneously. At the end of each cylinder are mounted two fixed pulleys, O, O, which receive the bands by which motion is communicated to the machine. In the two front parts of the machine are fixed two cutters, P, P^1 which turn in bearings in the piece, *q*, *q*, fixed to the frame. The cutter, P, has fixed to it a cutting-blade, and

the cutter, P[1], has a blade, but not having a cutting edge. The action of the machine is as follows: the skin is placed under the upper cylinder, and is taken between the two cylinders and pressed and drawn through, according to its length. When the skin is thus arranged, the two wheels, M, N, are put in motion, at the same time the cutter, P[1], is passed over the skin in pressing it against the upper cylinder. This pressure is effected by means of the cross-piece, K, which is moved by hand. The skin thus pressed is drawn by the two cylinders between which it is placed; the cutter, P, is then to be put in action, the cutting-blade of which is parallel to the surface of the upper cylinder; the edge of this cutter is somewhat similar to those which are ordinarily used. This cutter, in acting upon the hair side of the skin, removes what may be on, and equalizes the thickness of it: this machine performs the work which has heretofore been done by hand.

Description of Figs. 6, 7, 8,

Which shew views of the moveable cylinder or drum, the application of which has been previously described. A, represents the outer case. B, B, the axis of the inner cylinder. C, the inner cylinder. D, are cross-pieces, which keep the parts separate. E, F, are the supports for the cross pieces. G, D, shews the circumference of the inner cylinder. H, are pegs or pins placed thereon. I, is a metallic cloth closing the opening of the inner cylinder from the periphery, and from the arc. K, is the opening for putting in the skins. L, is the door for closing this opening. M, M, are the tubes, through which the steam or water or tanning matter is passed into the cylinder. O, is the ladder for the workmen to descend to regulate the cocks. P, shews the level of the liquid in the cylinder. *b*, *b*, are the wheels which communicate the motion to the machine.

Description of the Figs. 9, 10, 11,

Which shew various views of the mode of holding the

skins on the table, when under operation of removing the inequalities in the surfaces of the skins. *a, a,* represents the form of nipper or holder for holding the skins. *b, b,* is the table upon which the skins are laid. c, c, is the upright rod or bar which slides in a groove. *d,* is the lever which acts upon the holder, *a.* *e,* is the notch in which the lever *d,* rests. *f,* represents the weight attached to the lever, *d.* *g,* is the lever which acts upon the pins to raise the lever, *d,* when required, as before explained.

Description of Figure 12,

Shews a form of press used by me in the process of dressing skins.

In the foregoing descriptions and drawings I have described and shewn particular forms of machines; but I would have it understood, that I do not confine myself thereto, as variations may be made without departing from the character of the invention.—In witness, &c.

Enrolled July 22, 1841.

Specification of the Patent granted to Edward Dodd, *of Gloucester Place, in the County of Middlesex, Musical Instrument Maker, for Improvements in Piano-Fortes.*—Sealed November 7, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—*Now know ye*, that in compliance with the said proviso, I, the said Edward Dodd, do hereby declare the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

In constructing piano-fortes it is well known that, owing to the great strain of the strings, it has been found very

difficult to obtain a construction of framing which shall not bend or yield to such strain; and it is well known that various ingenious contrivances have been resorted to in combining the parts: and such difficulty arises from the circumstance of the strain being on one side or surface of the framing, having a tendency to draw the frame into the form of a bow. Now the object of the invention is so to apply the strings of piano-fortes, that the strain on both sides of the frame shall be made equal, or so nearly equal as to keep the framing free from any material quantity of strain, or one side more than on the other, owing to the strain on one side being compensated by the strain on the other side; by which the framing will be rendered capable of bearing a much greater pressure without injury, the strain resolving itself into a pressure directly through the centre plane of the framing. And in order to give the best information in my power, I will proceed to explain the drawing hereunto annexed, where the invention is shewn applied to an upright piano-forte, by a description of which a workman will readily understand the nature of the invention, and be able to apply it to upright as well as to other piano-fortes.

Description of the Drawing.

Fig. 1, shews a framing of an upright piano-forte with part of the strings shewn, as applied according to the invention, in order that the strain produced thereby shall be equal, or very nearly so, on either side of such framing.

Fig. 2, shews a transverse section of the same frame in a case of a piano-forte, but I have not thought it necessary to shew the action of a piano-forte, such part being well understood.

Fig. 3, shews a back view of the parts shewn at fig. 1, placed in a case.

Fig. 4, is an underside view of the frame, fig. 1; and figs. 5, 6, and 7, shew some of the parts full size. In

each of these figures the same letters indicate similar parts. *a*, *a*, is a rectangular framing to which the strings are applied; such framing consisting of the top rail, forming the wrest-plank, and the bottom rails, *a*, *a*, the two side rails, a^1, a^1, the series of uprights, a^2, a^2, and the cross rail, a^3, all framed securely together. I would, however, remark that the construction of the frame, *a*, *a*, may be varied, the invention not being for the frame but for the mode of applying strings to a suitable frame of a piano-forte. On the upper or top rail, *a*, are applied the tuning and other pins at front and back, for the two ends of each of the strings, as is shewn. *b*, is the sounding-board and bridge. *c*, *c*, are bars to the back of the sounding-board. On the under surfaces of the lower rail, *a*, are applied a series of pulleys, *d*, *d*, on axes, *e*, *e*, such axes being sustained by bearings, *f*, affixed to the lower rail, *a*, and the axes, *e*, *e*, are retained in their places in the bearings, *f*, by means of the straps, *g*. *h*, *h*, *h*, are washers applied between each of the pulleys, all which is clearly shewn in the drawing. And it will be seen that the strings are at the back as well as at the front of the frame, *a*, and the strain of the strings will have a tendency to draw the lower rail, *a*, towards the upper rail, *a*, in a direct line through the uprights, a^2, a^2, in place of the strain having a tendency, as heretofore, of bending the frame. And it will be further evident, that in tuning any of the strings in front, the strain will be immediately be equalized or nearly so on both sides of the frame, and the tendency of the whole strain will be to crush the frame from end to end in place of bending. The construction of the frame, *a*, *a*, offers great convenience in its being independent of the outer case, and readily transferred from one outer case to another. In constructing a piano-forte, as above explained, it will be seen that the strings at the back act as a means of counterbalancing the strain of the strings on the front. In making pianos according to the invention, I sometimes produce what may be called a double

piano-forte, by forming the case in such manner as to have the requisite action on both sides of the framing, *a, a;* but in such instances the strings at the front do not pass to the other side, nor do the strings at the back pass to the front side, but each set has suitable pins on the top and lower rails, *a, a*, to act as tuning and hitch-pins, by this means there would be the strings of two piano-fortes on the same frame, *a, a*, placed in a case, the strain of one set of strings counteracting the other, and causing the joint strain to act in the same manner as above described.

Having thus described the nature of the invention, and the manner in which the same is to be performed, I would have it understood that I do not confine myself to the precise arrangement shewn, as variations may be made, so long as my peculiar mode of applying strings to piano-fortes be retained. But what I claim is the mode of applying strings to piano-fortes, whereby the strain thereof is rendered equal, or nearly so, on both sides of a frame, as herein described.—In witness whereof, &c.

Enrolled May 7, 1841.

Specification of the Patent granted to GEORGE LOWE, *of No. 39, Finsbury Circus, in the City of London, Engineer to the Chartered Gas Company, for Improved Methods of Supplying Gas under certain circumstances, and of Improving its Purity and Illuminating Powers.*—Sealed March 16, 1841.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said George Lowe, do hereby declare that the nature of my said invention to consist in the following improvements:

The circumstances alluded to, for which I propose my improvements, are the deficiency of the supply of gas at

certain times and in certain localities. I also offer improved methods for insuring a greater degree of purity in the gas required for private lighting; as also the increasing its illuminating power. The result of my improved methods of supply and purification will, it is believed, be equally beneficial to gas companies as to consumers. Numerous are the complaints made at certain times, by the consumers of gas, of inadequate supply, arising from the want of pressure in the street mains, more especially so on dark days, and in the lower levels of a town or of an establishment. To remedy which, and to place the supply at all times more under the controul of the consumer, I apply to the gas-meter suitable means of giving to it a power of movement over and above that which is produced by the flow of gas through the meter. I also for two reasons increase the surfaces of the metal of which gas-meters are composed; firstly, in order thereby to augment the saturating power when charged with naphtha or other hydro-carbonaceous liquids, as proposed in my former patent, dated June 9, 1832; and, secondly, thereby to make the gas-meter act the part of a purifier, when charged with a solution of caustic potash or soda, instead of as heretofore, with water or other fluids. It has been thought desirable, in some instances, where the larger sized meters are required, not to introduce naphtha into them, but to saturate the gas in a separate vessel or apparatus. I have, therefore, invented two modes for effecting this saturation; first, by the intervention of sponges, fragments of coke, of pummice-stone, or other suitable vescular or capillary matter, moistened with naphtha; secondly, by the exhibition of extended surfaces of naphtha in a series of shallow trays, over which the gas is made to pass on its way to the burners. Either or both of these forms I find well calculated, when charged with a solution of caustic potash or soda, to purify the gas of sulphuretted hydrogen and carbonic acid. And when charged with a dilute acid, it will have the effect of de-

priving the gas of ammonia and its compounds. Thus, together, I free the gas from those impurities which may have escaped the usual purifying process at the works.

Having thus briefly stated the general objects of my invention, I will proceed to describe the best means I am acquainted with for performing the same, reference being had to the drawings and figures hereunto annexed; viz., figs. 1, 2, and 3, drawing No. 1, represent a gas-meter of the usual construction, with my additions, for giving a a better supply of gas under certain circumstances.

Description of the Drawings.

Fig. 1, represents a five-light meter, with my additions, drawn in section. The axis or shaft of the meter being extended through the back of the case of the meter, and kept tight by a stuffing-box; upon the end of this axis or shaft, I fasten a common shaped water-wheel that shall give a power, when necessary, over and above that which is produced by the gas itself. The water-wheel is enclosed in a case, the feet of which correspond with the feet of the meter; the water-wheel case being cut away, so as to allow the space covered by the feet to form a receiver or race for the water which is thence carried away by a pipe.

Fig. 2, shews the way in which the wheel is supported on the axis of the meter, and a form of bucket which I have found to answer the purpose. Instead of the axis being carried through a stuffing-box, it may receive motion from the water-wheel by a train of common wheel-work, carried up in the manner described in fig. 3; and in this way the stuffing-box is unnecessary. The water-wheel in this instance must be placed upon the upper projecting spindle. Instead of a water-wheel, I can use a weight to give the additional power to the axis of the meter, and it will be evident, that supposing the axis on which the water-wheel is placed was extended still further from the

back of the meter, and a cord wound round such axis, and a weight hung at the end of the cord, that a similar effect would be produced; but in this instance the weight would, when run down, require to be wound up again—this is effected by hand, precisely in the same way as in winding up clocks and watches; it is also evident, that the range of the weight may be varied by the train of wheel-work to suit the situation, and the weight proportionately increased, and thereby made to go a longer time, as in one and eight-day clocks; the projecting end, of course, being supported by an additional bearing, drawings of which are unnecessary, as any form of frame-work, or arrangement of wheel-work, or motive power, which will give an uniform impetus to the axis of the meter, will answer the purpose.

Drawing A, fig. 4, represents the sections of a gas-wheel, or that part of a gas-meter which measures the gas; and,

Fig. 5, the same gas-wheel, with my addition or increase of the surface of the metal, which is effected by placing around the circumference of the gas-wheel a rim or covering about one inch larger in diameter, fastened and supported by small studs, and, consequently, revolving with the gas-wheel; the gas passing in the direction of the arrows, and thereby coming in contact with an additional quantity of the fluid which the surface of the metal has taken up, or when it is found more desirable to produce the same results in a separate vessel or apparatus, it is shewn in drawing No. 2. Fig. 1, represents the front elevation of a double box or vessel (calculated for eight or ten Argand burners) made of tin or other suitable material, containing six rows of shelves or wire-gratings, on which is placed a stratum of sponge, or other suitable material, through which the gas is made to pass in the direction of the arrows, as shewn in fig. 3;—fig. 2, being an end elevation of the same. When this vessel is required for extracting sulphuretted hydrogen, and thereby give in-

creased purity to the gas, the sponges in the first partition must be saturated with a solution of caustic potash or soda, introduced through the funnel above; which solution falling upon a perforated shelf or cullender, will be equally distributed over the surfaces of the sponge. The like operation, with naptha, is gone through in the second partition, when required for giving increased illuminating power to the gas; when the extracting of ammonia from the gas is the object, a solution of diluted acid may be substituted, such as sulphuric, muriatic, or other suitable acids, for that of the alkali, the partition containing the acid will require protection by covering the internal surface with a mixture of bees'-wax and tallow. It will be evident, that a vessel having three or more partitions, will allow the three operations to be going on at the same time, as represented by figs. 5 and 6. The first partition, A, being charged with dilute acid; B, with caustic alkaline solution; and, C, with naphtha. It is obvious, that any or all these partitions may be charged with either acid, alkali, or naphtha.

Fig. 4, represents a plan of the vessel; fig. 1, when divested of its cover, shewing the upper shelves or wire-sieves for supporting the sponge or other material, and its packing or luting joint to which the cover is screwed. The small stop-cock to each partition, is for drawing off any surplus fluid. Another mode of producing the same results in a separate vessel or vessels is shewn.

Figs. 6 and 7, drawing No. 1, are elevations of a box or vessel containing shallow trays, calculated for eight or ten lights.

Figs. 8 and 9, are sections of the same, in which the gas is made to traverse over the surfaces of naphtha or other fluids (previously alluded to), in a series of shallow trays, the arrows shewing the direction of the gas. The fluid, as in the former case, is supplied through the funnel at the top above the trays; and as each tray is filled, it overflows into the next lower one, until the fluid shews

itself at the small stop-cock below, which indicates that the apparatus is charged and ready for use.

Fig. 10, shews the plan of the top.

Fig. 11, the plan of tray.

Figs. 12 and 13, sections and elevations of a tray; and,

Figs. 14 and 15, cross section and elevation of trays. It is obvious, that a vessel of three compartments, each containing a series of these trays, the first charged with dilute acid, the second with caustic alkaline solution, and the third with naphtha, that similar results will be produced as with shelves and sponges, &c., previously described. It will be observed, that the lower tray is deeper than those above it, to allow the tube to stand up above the surface of the fluid at the bottom of the box for the introduction of the gas; when a vessel of three series of trays is used, the gas passes from the second to the third in a similar manner. It is scarcely necessary to mention, that as the naphtha is absorbed, or the alkaline solution or dilute acid become saturated, that they must be renewed.

Drawing No. 3, exhibits a mode of applying my system of sponges, saturated with naphtha, to a table gas-lamp. The arrows shew the direction of the passage of the gas through it to the burner. It will be observed, the top of the vase unscrews for the purpose of re-charging the sponges with naphtha. I would observe, that the regularity of the flow of gas through meters, thus aided by motive power, is greatly insured by then passing the gas through the well known instrument, called the gas governor or regulator.

Having thus described my invention, I would have it understood, that what I claim is, first, the application of mechanical means for giving a power of moving gas meters beyond what is produced by the flow of gas through them.

Secondly, the mode of better adapting gas-meters by increasing their surfaces, for the purposes hereinbefore mentioned.

Thirdly, I claim the application of alkaline solutions in gas meters, for the purpose also herein before described.

Fourthly, I claim the application and use of sponge or other suitable material, and also the use of shallow trays, containing caustic alkaline solutions, which, by their extended surfaces, the gas is further purified from sulphuretted hydrogen and carbonic acid; and, when charged with a dilute acid, will also take up the ammonia and its compounds.

Fifthly, I claim also the application and the use of sponge, or other suitable material, and the use of shallow trays charged with naphtha, or other volatile hydro-carbonaceous liquids, for increasing the illuminating power of coal-gas, in the manner hereinbefore described.

I would remark, that I do not confine myself to the use of any particular construction or size of gas-meter, only so fas as the gas-meter being put in motion by mechanical means over and above the power which the flow of gas has upon such meter; and such my invention being, to the best of my knowledge and belief, entirely new, and never before used in that part of her Majesty's United Kingdom of Great Britain and Ireland called England, her dominion of Wales and town of Berwick-upon-Tweed, I do hereby declare this to be my specification of my said invention, and that I do verily believe this my specification doth comply in all respects fully, and without disguise, with the proviso in the said hereinbefore in part recited letters patent contained: wherefore I do hereby claim to maintain exclusive right and privilege to my said invention.—In witness whereof, &c.

Enrolled September 16, 1841.

Specification of a Patent granted to Abel Morrall, *of the Parish of Studley, County of Warwick, Needle Maker, for certain Improvements in the Making or Manufacturing of Needles, and in the Machinery or Apparatus employed therein.*—Sealed January 3, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Abel Morrall, do hereby declare that the nature of my said invention and the manner in which the same is to be performed, are particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the letters and figures marked thereon (that is to say):—

My improvements in making or manufacturing needles, and in the machinery or apparatus to be employed therein, consist in an improved mode of clearing and finishing the eyes of sewing needles, by removing any burrs, feathers, or sharp edges from the inside of the eyes of such needles, which, without being so cleared and finished, would be subject to cut the thread in the operation of sewing. As I do not propose any variations in the other parts of the operations of manufacturing needles, it will be unnecessary for me to describe the usual modes by which that manufacture is conducted. I shall, therefore, confine this specification or description to my improved process, and to the construction of the machinery, by which I effect the object above stated. I take any convenient number of needles, in any state or states of their manufacture, after the eyes have been pierced, punched, or otherwise formed, and through the eyes of a series of these needles I pass a fine wire, which I prefer to be of hardened steel, the surface of which may be roughed or

indented by a file or otherwise; or the wire may be made with an angular edge or edges, or charged with a composition of some grinding or polishing material, as emery and oil, or it may be smooth wire; or it is possible that some string or cord of animal, mineral, or vegetable matter, charged with a grinding or polishing material might answer the purpose. When a series of these needles have been thus spitted or strung, I then distend the wire, string, or cord, carrying the arms or bearings, in any convenient machine or apparatus, for the purpose of giving to the needles a very considerable shaking or reciprocating agitation; or it may be a revolving motion: when the rubbing of the interior of the eyes of the needles against the wire, string, or cord, on which they are spitted or strung, will cause the burrs, feathers, or sharp edges, to be ground, polished, or burnished off, and the eyes to be rendered perfectly smooth within.

Description of the Drawing.

In the accompanying drawing, fig. 1, represents a front view of my new improved construction of machine to be employed for this purpose.

The machine is enclosed in a box or case, shewn in section at *a*, *a*, *a*.

Fig. 2, is an end view of the same machine; and,

Fig. 3, a vertical section, taken through the middle of fig. 1, looking towards the left.

An axle, *b*, mounted in plummer-blocks in the case, has the wheels or arms, *c*, *c*, *c*, fixed upon it; between which wheels or arms are distended the wires, strings, or cords, *d*, *d*, *d*, when the needles have been spitted or strung upon them. A more simple plan of the machine is represented at fig. 4, by means of which, in the first instance, I will describe the mode of conducting the operation. The needles having been spitted or strung upon the wires as said (which wire I prefer to be of hardened steel), the ends of these wires are made fast to the arms or rims of the wheels, *c*, *c*, *c*, and they may be supported in the

middle by standard rods, *e*, *e*, which extending from the axle, *b*, having a screw and socket at the end to receive the wire. The axle is then put in motion, by any convenient means capable of giving to the arms or wheels a quick reciprocating action, that is, moving them to and fro through a small part of a rotation, and back again, with great rapidity. By these means the needles will be made to swing down upon the wires in a confused way, and the wire operating upon the interior of the eyes of the needles, will grind, polish, or burnish off all burrs, feathers, or other sharp edges, which may have been left by the cutting-tools in the piercing or opening of the eye. The operation is performed by similar means in the improved construction of machine, shewn at figs. 1, 2, and 3. The axle, *b*, carrying the arms or wheels, *c*, *c*, *c*, with the wires on which the needles are spitted or strung, receives a rapid reciprocating movement, for the purpose of shifting about the needles, by means of a bow and string applied to the pulley, *f*, or by any other convenient contrivance; but in this instance, the wires are made to turn in the arms or wheels, and in an opposite direction to that in which the arms or wheels move, thereby causing the wires to produce additional friction, on the eyes of the needles, and consequently performing the clearing, polishing, or burnishing operation with greater effect and in much less time. And in order to give the required movements to the wires, *d*, I fix their ends by means of screws, *l*, *l*, in loose studs, *g*, *g*, *g*, which turn in the arms or rims of the wheels, *c*, *c*, *c*. Each pair of studs are connected together by a bent rod, *h*, *h*, *h*, and upon one of the studs is fixed a pulley, *i*, *i*, *i*; and a tight stationary band, *k*, is passed over all the pulleys, and made fast at its ends to the box or case, as shewn at figs. 1 and 2. By this arrangement, when the arms or wheels are made to move round in one direction, the wires are turned in the opposite direction, and hence the eyes of the needles are subjected to the double effect of their own friction

against the surface of the wire as they fly round, and the abrasion of the rough surface of the wire turning the reverse way.

Lastly, I desire it to be understood, that though I have shewn in figs. 1, 2, and 3, a peculiar construction of machine, which I have found to be well suited to the effective performance of clearing, polishing, or burnishing the eyes of needles; yet I do not intend to confine myself to such peculiar construction of machine, as the effect might be obtained by a variety of those forms of apparatus, on which needles being spitted or strung upon wire or strings, are submitted to quick agitation, might have their eyes cleared, polished, or burnished by such means; and therefore, should consider any such variations as embracing the principles of my invention as set out above.—In witness whereof, &c.

Enrolled June 27, 1839.

Specification of the Patent granted to JONATHAN GUY DASHWOOD, *of Ryde, Isle of Wight, Plumber, for Improvements in Pumps.*—Sealed February 22, 1841.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Jonathan Guy Dashwood, do hereby declare that the nature of my said invention and the manner in which the same is to be performed, are particularly described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

The usual method of raising and forcing water and other fluids, from a lower level to a higher, to discharge an uniform and constant stream, is either by the aid of

an air-vessel; the discharging the contents of three barrels alternately into one main-pipe, by rods attached to a triple-crank in the usual way; or by working three buckets in one barrel with rods or tubes passing through stuffing boxes and fixed to a triple-crank on the top of the barrel: all of which methods are objectionable from the great liability to choke, by the bucket-rods being fixed inside the barrel, and also from the great quantity of friction occasioned by the number of such rods and stuffing-boxes.

Description of the Drawing.

The method I propose, is to work within one long or three short barrels, two cylinders or long buckets, with valves fixed on the same in the usual way, each bucket about twice and one quarter the length of the required stroke, and each to be attached to slings or rods passing up and down on the outside of the working barrels, and to be attached to the outside of the buckets between the ends of the barrels, as shewn in the drawings, or through openings in the long barrel (if one only is used) made for that purpose. The ends of the buckets to fit water-tight within the barrel or barrels, by the aid of stuffing or cupped leathers, as shewn in the drawing, by *i, i, i, i, i, i, i, i*, in figs. 1 and 3, or be turned accurately, so as to fit the inside of the barrels, and each bucket to be fixed to the slings in such a way, that during the stroke no opening will be made for the escape of water between the ends of the buckets and barrels. The slings to be enclosed from the bottom upwards, as high as the top of the working-barrel within a casing, and such casing to be filled with water to keep the leathers saturated, and to prevent the air from penetrating between the working barrel and buckets.

The slings of each bucket to be attached to a separate crank-shaft, with an eccentric oval cog-wheel fixed on

each crank shaft, and to be driven by a third eccentric oval cog-wheel fixed on a shaft and placed between the other two, in such a manner that the cogs on the long leverage of the centre or driving-wheel, shall fit into the short lever-cogs of the adjoining wheel, and the short lever-cogs of the aforesaid driving-wheel, to fit into the long lever-cogs of the other adjoining wheel, so that by turning the centre or driving-wheel regularly round, one and the other bucket will be continually ascending, and causing a constant flow through the suction and discharging pipes. A communication to be formed between the water in the barrel over the top of the top bucket, and that in the barrel under the bottom of the bottom bucket, by means of a small pipe fixed in the same, and leading down outside of the working-barrel, with a three-way cock fixed in such barrel, near the top of the pipe, to regulate the supply of water in the reservoir or casing.

I do not claim as my invention, the working of two buckets in one barrel. But what I claim, is the introduction of the long-buckets, and the method of working the same, by the slings being fixed to the outside of them after passing down outside of the working-barrel. I also claim the introduction and use of eccentric-wheels for pump work, so as to give that peculiar action to the crank-shafts, by causing them to travel at different rates of speed during each revolution of the driving-wheel.

Letters of Reference.

The same letters will apply to each figure. *a*, *a*, *a*, the working-barrels. *b*, *b*, the long-buckets with a valve on the top of each. *c*, *c*, *c*, the slings or rods. *d*, *d*, the two cranked-shafts to carry the slings. *e*, *e*, *e*, three eccentric oval cog-wheels. *f*, driving-wheel shaft supporting the centre cog and fly-wheel. *g*, the fly-wheel,

h, h, h, h, the reservoir or casing to be filled with water. *i, i, i, i, i, i, i, i,* cupped leathers fixed either to the ends of the buckets or barrels, as shewn on the plan figs. 1 and 3. *j, j,* pieces cast or fixed on the barrels to support them within the casing, by screws passing through them and the casing. *k, k,* a small pipe (in figs. 1 and 3) to form a communication between the top and bottom barrels, with the three way-cocks, *l,* fixed in same. *m,* the suction-pipe. *n,* the discharging-pipe.—In witness whereof, &c.

Enrolled August 22, 1841.

Specification of a Patent granted to Josiah John Guest, *of the Dowlais Iron Works, in the County of Glamorgan, Baronet, and* Thomas Evans, *of the same place, Agent, for certain Improvements in the Manufacture of Iron and other Metals.*—Sealed May 28, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye,* that in compliance with the said proviso, we, the said Josiah John Guest and Thomas Evans, do hereby declare the nature of our said invention to consist in forcing damp steam into the melted mass of metal, whatever it may be, contained in the melting furnace used for melting the said metal in; and particularly into the melted iron in refining and puddling furnaces, as also in a certain paste made with the said steam and melted cinders, and applied as hereinafter explained; and in further compliance with the said proviso, we, the said Josiah John Guest and Thomas Evans, do hereby describe the manner in which our said invention is to be performed, with reference to iron, by the following statement thereof, reference being had to the drawings annexed, and to the figures and letters marked thereon (that is to say):—

Description of the Drawing.

Fig. 1, represents the front elevation of a puddling-furnace. A jet or jets of steam is or are introduced into this furnace, in contact with the melted iron, while in a state of what is usually called fermentation: the steam is conducted through the roof of the furnace, as here shewn, through wrought-iron telescope-tubes, sliding one over the other; by means of which tubes we are enabled to convey the steam very near to the surface of the fluid iron to be acted upon: the success of the operation depends much on bringing the steam in close contact with the melted iron; therefore, any other plan of introducing the steam close to the iron may be found to answer the same purpose—the steam that we have used for our experiments has been supplied from the ordinary engine-boiler; but, as shewn in the case of the refinery furnace, fig. 4, we purpose generating the steam in the chimney of the furnace; the pressure we have used in the puddling-furnace has been about 15 lbs. to the inch, through four pipes, A, A, A, A, three quarters of an inch in diameter, which answer very well during this process, in order to keep the sides, bridge, and bottom of the furnaces from burning. We introduce a quantity of steam upon the fluid cinders as soon as the heat is drawn until the cinder become of the consistency of paste; we then, with a rabble or rake, rake as much of that paste, and place it against the back sides and bridge of the furnace, as may be required, to fill any cavity that may have been burned during the previous heat of iron; the use of the cinders in a state of paste for repairing the bottom and sides of the furnace keeps the iron quite clean and free from dirt, which is always found from the use of clay and limestone, as at present used. The tubes, A, A, A, A, which pass through the roof of the furnace, slide over the tubes, B, B, B, B, forming thus telescope-tubes; and they are raised or lowered according to the quantity of fluid metal in the furnace, by means of the

lever, C, and handle, D, by which it is worked; the dotted line shews the height of the fluid metal. E, is the steam-pipe. F, the connecting-pipe, for communicating alike to all the four telescope-tubes; and G, is a condensed water-pipe.

Fig. 2, is a side elevation; and,

Fig. 3, a plan of the puddling-furnace.

And now, as to the refinery-furnace, we introduce a jet or jets of damp steam, after the pig-iron is melted, through the same aperture as the blast: the quantity and temperature of the steam must depend upon the quality of the pigs to be acted upon: we use four pipes of half an inch in diameter, with a pressure of 20 lbs. to the inch, and find it answers our purpose: the steam is by us generated in the chimney of the finery-furnace; but it may be conveyed from the engine-boilers.

Fig. 4, represents a side elevation of our steam-apparatus, shewn in two of the four twyers or apertures of a refinery-furnace; and,

Fig. 5, another view of it. In fig. 4, H, H, are two of the steam pipes, the steam being generated in the tube or cylinder, I, in the flue or chimney, which cylinder, I, is filled with water; J, being a water-feed pipe, and K, a pipe, on which to place a safety valve.

Now, whereas we propose to apply steam in a similar way in the melting of alloys of copper and iron, and of tin and iron, which alloys can be made in refinery and puddling furnaces by it; but in particular we apply our said invention to the manufacture of iron, whereby we obtain a better material with greater economy. And we claim as our invention the use or application of steam forced upon or into, or in contact with, the melted iron, in refinery or puddling-furnaces for the manufacturing of the same. And also the similar use of steam in the process of melting or manufacturing alloys of copper and iron, and of tin and iron, in such furnaces; and also the application of steam to fluid cinders, as hereinbefore de-

scribed, to produce the paste aforesaid, and the use or application of the said paste, as aforesaid. And such our invention being, to the best of our knowledge and belief, entirely new, and never before used within that part of her said Majesty's United Kingdom of Great Britain and Ireland called England, her said dominion of Wales or town of Berwick-upon-Tweed, we do hereby declare this to be our specification of the same; and that we do verily believe this our said specification doth comply in all respects fully and without reserve or disguise, with the proviso in the said hereinbefore in part recited letters patent; wherefore we do hereby claim to maintain exclusive right and privilege to our said invention.—In witness whereof, &c.

Enrolled September 28, 1840.

Specification of a Patent granted to JOHN WHITE, *of Manchester, in the County of Lancaster, Engineer, for certain Improvements in Vices.*—Sealed April 23, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said John White, do hereby declare the nature of the said invention, and the manner in which the same is to be performed, is particularly described and ascertained in and by the drawings hereunto annexed, and the following explanation thereof (that is to say) :—

My improvements in vices consist in a novel construction of portable vices, with jaws capable of expanding much wider, and in a much greater degree of parallelism than those in common use, by being formed upon upper ends of long levers or arms, having their fulcrums near to or on the floor of the platform; and also so constructed,

that the vice may be taken to the work instead of the work to the vice, as heretofore, without requiring any fixing, their own weight being sufficient in all cases to keep them perfectly steady; these vices are also provided with a table for the purpose of holding files, hammers, or other tools close to the hands of the workman. Another modification of my improved portable vice is so constructed, that one jaw only may open horizontally, whilst the other is stationary; and also a further modification of the same is so arranged, that the holding-jaws are allowed to turn on a swivel, in order to hold or secure work which has not square or parallel sides, but is angular, bevelled, or any irregular shape. But in order that my improvements in vices may be more perfectly detailed and better understood, I have attached to these presents, a sheet of drawings, representing such views of my improved portable vices as are necessary for their explanation, and marked the same with figures and letters of reference corresponding with the following description thereof:—

Description of the Drawings.

Fig. 1, represents a partial sectional elevation of my improved portable vices, and consists of a pair of holding jaws, *a*, *b*, formed upon the upper ends of levers or arms, *c* and *d*, which are mounted upon fulcrum pins, *e* and *f*, and thus supported upon the bed-plate or platform, *g*, *g*; each of the jaws, *a*, *b*, contain a nut or box, *h*, for the vice-screw, *i*, *i*, to bear in, which are so constructed as to preserve a perfectly parallel position with the screw in whatever position the holding jaws may be. The opening of the holding jaws is also assisted by the plate, *j*, and sliding-guide rods, K, K. This plate, *j*, is provided with mortices for the reception of any tools not in immediate use, and is placed as a table or bench for the workman. The vice-screw is protected from filings, &c., by a box or cover, *l*, sliding in the openings of the holding-jaws.

Fig. 2, is a front view of the holding-jaw, *a*, detached; and,

Fig. 3, is a similar view of the holding-jaw, *b*.

Fig. 4, is a plan of the bed or platform, *g*; and,

Fig. 5, is a plan-view of the vice with the holding-jaw thrown entirely backwards.

Fig. 6, is a partial sectional elevation of another modification or construction of portable vice, in which the holding-jaw, *a*, is made fast or stationary, and the jaw, *b*, only vibrating upon its fulcrum-pin, *c*, when acted upon by the screw, *d*. *e*, *e*, is also a morticed-bed or table for holding tools, &c. *f*, *f*, is a foot-plate for the purpose of supporting the holding-jaws.

Fig. 7, is a plan-view of the vice complete.

Fig. 8, is a side view of the foot-plate, *f*, detached; and,

Fig. 9, is a front view of the moveable jaw, *b*, also detached.

Fig. 10, is a partial sectional elevation of another modification or construction of my improved portable vice, in which the holding jaws are allowed to turn or swivel upon a centre, in order to accommodate their holding surfaces to any bevelled or irregular-shaped article, the holding-jaws, *a* and *b*, are mounted on their fulcrums, *c* and *d*, in bed-plates or frames, *e* and *f*, which parallel-plates are allowed to swivel or to turn upon a common centre-pin, *g*, as shewn in fig. 11, which is a plan-view of the vice with the jaws thrown entirely back. The jaws may be held square, when required, by passing a pin, *h*, through small holes in the plate, *e* and *f*. This vice is assisted in its operation by means of the morticed table, *i*, *i*, being furnished with a descending weight, *j*, which, as the screw is turned for opening the jaws, carries the friction-rollers, *k*, *k*, on the sides of the table to act against the inclined planes, *i*, *i*, on the holding-jaws, and thus open the jaws: the nuts or boxes, *m*, of the vice-screw, *n*, are turned spherically, acting in the circular openings in the holding-jaws, and also facilitating their operation; the vice-

screw may also be protected by sliding a cap, as at *o*, over it, and fitting the round-box, *n*.

Fig. 12, is a plan of part of the vice, shewing the holding-jaw set square; and,

Fig. 13, is a view of the vice-screw, and its nuts or boxes detached.

Having now described my improvements in vices, I desire it to be particularly understood, that although I have shewn in the drawings attached three modifications in the construction of my improved vice, such have only been done for the sake of illustration; as I claim as my invention the construction of portable vices, which may be carried to the work instead of being fixed to a bench, and having the range of opening of the holding-jaws of greater extent, and much more parallel, owing to their length, without being confined to the precise shape, form, or dimensions of those shewn in the drawings attached.—In witness whereof, &c.

Enrolled October 22, 1840.

Specification of a Patent granted to THOMAS SPENCER, *of Liverpool, in the County of Lancaster, Carver and Gilder, for an Improvement or Improvements on the Manufacture of Picture and other Frames and Cornices, applicable also to other Useful and Decorative Purposes.*—Sealed March 8, 1841.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Thomas Spencer, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, is particularly described and ascertained in and by the drawing hereunto annexed, and as follows (that is to say):—

Firstly, a method of manufacturing picture and other frames of copper. In the prosecution of this method, I usually proceed as follows: A model is first made after a given design—it may be of wood, clay, wax, or other non-conducting substance, or it may be of metal. This model serves as the original from which any number of the same design may be made in the following manner: A series of reverse or intaglio moulds are to be produced from it by the common process of casting; varying, however, the method according to the substance of which the original is formed: as, for instance, should the original be of wood, metal, plaster of Paris, or incurated or baked clay, then the moulds may be made from any easily fusible metal, as the metal used for type-founding, or the metallic compound, termed, "Newton's fusible metal;" or they may be made from wax, or stearine, or compounds of these, or other plastic substances, with plaster of Paris: should, however, the original model be produced in wax, or any substance fusible, at a less temperature than boiling-water, then the reverse mould cannot be made of metal (in the first instance), but must be cast from in the cold state, as with plaster of Paris, or it may be made a conductor of electricity by any of the methods hereafter to be described, and a reverse obtained from it in metallic copper by the action of voltaic electricity, following in every particular the instructions that are hereinafter given to produce the frames by the same agency: should it be expedient to make the reverse moulds of a metallic substance or compound, then they require no further preparation before being placed in an electrical apparatus; but should they be made of any of the non-metallic or non-conducting, already stated, then their surface must be prepared in the following manner, in order that it may be become a conductor of electricity. To effectuate this purpose, I have invented, and already published, the whole of the practical methods that are before the public, and applicable to surfaces of all descriptions; but I give

preference to the following for the manufactures claimed in this patent, though I do not intend to claim the exclusive use of it; the non-conducting substance must receive a coating of thin varnish with a camel's-hair brush: it must then remain till it is nearly dry, which may be ascertained by application of the finger, which, when in the proper state, will adhere slightly; while in this state a metallic powder of copper, usually termed bronze powder, must be applied, with a dry camel's-hair brush, to the partially dry surface of the mould, until it is wholly covered and rendered metallic. In this state the mould or model is ready to be placed in the electrical apparatus, where copper may be deposited on it of any thickness. The electrical or voltaic apparatus to be used for the purposes of this patent, may be what is termed the single cell apparatus, as where the prepared surface is made to act as one of the plates or elements of the apparatus, or where the electrical force is conducted by wires from the battery into an adjoining cell; this latter is usually termed the compound apparatus, both forms of which having been invented by myself, and described by me in various publications, are not intended to be claimed under this patent.

I shall here, however, describe by a drawing, that form to which I give the preference.

Description of the Drawing.

A, a vessel, containing a solution of a salt of copper: for this purpose I prefer the solution of the sulphate. B, a vessel, containing a single pair of metallic plates or surfaces, arranged as a galvanic battery, as zinc and platinum, zinc and silver, zinc and copper, or either of these metals, and substituting iron in place of the zinc. The principle being that of placing two metals opposite each other, which shall have opposite electrical properties, usually termed positive or negative with respect to each other. C, will represent the negative or platinum plate;

D, the positive or zinc-plate. The mould of the picture or other frame must now be placed in the vessel, A, and is indicated in the drawing by F. It is then made to communicate by a wire with the positive surface, D, in the vessel, B. A surface or plate of copper, E, must also be placed in the vessel, A, and opposite the surface of the mould, to be deposited on. This latter surface must be made in like manner to communicate by a wire with the surface, C, in the vessel, B. The plates in the vessel, B, may be excited into action by diluted sulphuric acid. This arrangement being completed, the action in the vessel, B, is kept constantly up until the deposit of copper, which will be the effect of the arrangement, is considered to be of sufficient thickness on the surface of the mould. The copper-frame, which will have been formed, is to be removed, which may be done by a slight application of heat. The back of the frame may now be filled up with solder, in order that it may be level: a slip of metal is then to be fastened entirely round it. This is usually termed the rabbitt, and is intended for the picture and glass to be fitted into. At this stage the frame is ready to undergo the process of gilding, silvering, or being covered with platinum. The claim here made is for this application of voltaic electricity to the manufacture of picture and other frames.

Secondly, a similar method of manufacturing moulds and other patterns, from which may be cast ornaments in the material usually termed by carvers and gilders composition. And in the material termed papier maché, suitable also for casting glass, earthenware, and china. To make moulds for these purposes, I usually proceed in the following manner:—An obverse or exact model of the required ornament is procured—it may be of any substance, metallic or non-metallic; it is then to be fastened to a perfectly flat or smooth surface; I prefer a plate of polished metal or glass. It may be fastened to the plate by thick white paint or varnish: should the model be

fastened on glass, and at the same time be itself non-metallic, the glass and mould must be metallized in the manner described in the preceding claim, or should the plate be metallic and the model otherwise, then the model only must be metallized. When this process is perfected, it is ready to be placed in the vessel, A, in the drawing, and attached or arranged, as F and D. It must remain for four, five, or six days in this apparatus, the time varying with the thickness of the metal that is required to form the mould. I generally suffer the operation of voltaic deposition to proceed until it has acquired a coating of one-eighth of an inch. It is then removed from this apparatus, and the deposit taken off the surface it has been deposited on: should it have been deposited on glass, it may be very easily removed by applying the edge of a common knife between the deposit and the plate; but should it have been deposited on a metal plate, then the edges of it will have to be cleared of the deposit by filing. It may then be removed in the same manner as the preceding. When the mould of the ornament thus formed is removed, it must be tinned on the back part by any of the methods in common use, or it may be tinned before removal from the plate by voltaic electricity, the process to be hereafter described. The process of tinning is resorted to for the following reason: when the deposit of copper is the proper thickness, its outward surface or back presents a rough fac simile of the ornament deposited on, and consequently the surface is unequal; but for most of the purposes that these moulds will be required, it is necessary that the back of them should be perfectly level, as when in use. They are submitted to the action of a press to obtain this necessary object: the deposit is first tinned; then any metal that will sustain the necessary pressure is poured on the tinned back of the mould while in the molten state, the tinning causing the necessary adhesion to take place. For most purposes, lead will be found sufficient; but in some instances, where the pressure is but slight, it

will be sufficient to give the back a coating of any hard cement, or even plaster of Paris, and close the whole up in a *wooden* box, leaving the face surface of the mould only exposed. But in all cases, where molten glass has to be pressed into these moulds, it then becomes necessary to use a metal for the outside coating that is not easily fusible, such as brass or iron: these are to be fastened to the deposited copper-moulds by the process of brazing. Moulds for casting in glass may also be made by taking any article formed of glass, and cut and polished by the wheel, as in the instance of a drinking tumbler. It may then receive a coating of thin varnish, and be metallized in the manner already described; and in that state it may be put into the vessel, A, and be deposited on as before described. Moulds for casting glass may be made in one or more pieces, as may be consistent with the design. The claim here made is for this practical application of voltaic electricity to the manufacture of moulds for the purposes above enumerated.

Thirdly, a method of manufacturing obverse moulds or patterns in copper, for the purpose of casting or founding decorative ornaments in iron. Moulds for this purpose have been hitherto carved or otherwise formed in wood, or modelled in wax or clay; and when so modelled, facsimilies are obtained of them in brass or other metal, by casting by heat, care being taken that the back part shall be kept hollow, for the double purpose of lightening the ultimate castings and insuring an uniform thickness of metal. My improvements consist in adopting the following methods:—A given model or pattern is obtained, and may be constructed by any of the usual methods:—A cast is then to be taken from it, which will be a reverse of the original. This cast may be taken in a soft fusible metal, wax, stearine, or plaster of Paris. I usually prefer stearine. When the cast is obtained, it must be metallized in the manner I have described in the first part of my invention, and placed in the vessel, A, and attached to D, in the

vessel, B, as indicated in the drawing. In order, however, to insure the great desideratum, viz., that the back part of the mould or copper deposit shall present a surface at once smooth and uniformly the reverse of the front surface, instead of placing the surface to be deposited on perpendicularly in the vessel, A, as in the drawing, it is to be placed horizontally. The surface to be deposited on being opposite to the bottom of the vessel, underneath it, and resting on the bottom of the vessel, shall be placed the copper surface that is to be eroded, and which supplies the copper for the deposit. This arrangement may be kept up until the deposit is of the required thickness, which is usually the case in five or six days, varying with the size of the required casting, should it be of a large size, the thickness of the deposit of copper will require to be greater, to insure strength in the ultimate casting. The deposit so obtained, when removed from the matrix on which it has been formed, is ready to serve the purpose of an obverse mould or pattern that may be pressed in sand or other material, for the purpose of casting iron. The claim here made is for this practical application of voltaic electricity, for the purpose of making patterns or moulds for iron founders in copper.

Fourthly, for the methods hereinafter mentioned of covering the surfaces of metallic picture and other frames with gold, applicable also to other surfaces, whether decorative or to resist the action of the atmosphere, fluids, or acids; the same being applicable to raise or emboss devices in gold, or its alloys on the above surfaces. To prepare a solution for this purpose, I proceed, in the first instance, as follows :—I dissolve pure gold, or any of its alloys in bromine. This is most conveniently done by adding the gold to the bromine in a highly comminuted state, as when beaten into leaf gold, until the liquid refuse to dissolve a further portion of the gold; or the solution may be prepared by mixing one part of bromine and alcohol in equal parts, with one part acetic acid and four parts

water. To this mixture let a few drops of sulphuric acid be added. Solid gold may be added in this compound by attaching the gold required to be dissolved to the plantinum end of a galvanic battery, while another piece of gold is in like manner attached to the zinc end of the battery: these pieces of gold, forming what is usually termed the poles of the battery. These pieces of gold so attached must be immersed in the fluid compound, containing the bromine, and when the battery is excited into action, the gold attached to the platinum end of the battery will be dissolved, thus forming a solution of gold with bromine. The solution being obtained in either of the above described methods, the surface to be gilt or covered with gold, must now be cleaned either by a dilute acid, or by being boiled in an alkaline ley, or by friction, adopting the usual methods to obtain this object, no claim being here made for any of them. It must then be placed in the vessel, A, in the drawing, and attached to the vessel, B, by a wire connecting it with D. F, being the surface to be gilt. In like manner another surface, but of gold, either pure or an alloy, must be opposed to the surface, F, and placed in the same vessel. This is to be eroded or dissolved by the galvanic action, and is represented by, E, and is also attached to, C, in the vessel, B, by a wire. When the battery-plates contained in B, are excited into action, the fluid compound of gold and bromine is to be added to the vessel, A, and the surfaces, F and E, will be acted on, the one being covered with gold, the other losing a like portion of its surface. This action may be kept up for any length of time, according to the thickness of the gold required to be deposited; a surface is usually covered in from one two hours. I find it necessary to add three parts of water to the solution obtained by the method described in the first instance, and also a few drops of sulphuric-acid to render the fluid a better conductor of electricity. Where a thick deposition of gold is required, I prefer to add to the solution of gold

and bromine a solution of an ammoniacal salt. I generally prefer two parts of the acetate of ammonia in solution to one part of the gold and bromine. Where the metal required to be gilt is a compound, and of such a nature as to act on the solution of gold and bromine by the mere act of immersion, I prefer to add a carbonate of an alkali as carbonate or bicarbonate of soda in excess, this being ascertained by a portion of the salt remaining undissolved at the bottom of the vessel. I have invented another method of covering metals with gold, which only differs from the above by the method of preparing the solution combined with the gold; in all other respects it is exactly similar. This solution is prepared by taking one part of iodide of gold and dissolving it in twenty parts boiling water, then adding four parts of a saturated solution of acetate or muriate of ammonia, and boiling the whole for half an hour, or the iodide of gold may be dissolved in a solution of two parts of prussiate of potassa, adding ten parts boiling water. This compound solution must then be boiled for an hour, taking care to add water as evaporation takes place, or a larger quantity may be added at the commencement. The solutions thus prepared must be used in the vessel, A, following the instructions given with respect to the solutions of gold and bromine. When it becomes necessary to form a device or embossment in gold, the deposit must take place in a metallic mould, containing a reverse of the design. This mould may be engraved, struck with punches, or cast. The mould to be placed in the vessel, A, at F, and attached to the battery, as in the former instances. The surfaces of materials having been covered with gold by these methods, must be treated in the same manner as surfaces are usually treated, covered with gold by other methods, either being left dead, or brightened with the burnisher. The claim here made is for the use of bromine and iodine combined with gold, in conjunction with voltaic electricity for the purposes herein enumerated.

Fifthly, for methods of covering with silver surfaces similar to those enumerated in the fourth part of my invention. These methods are in all respects similar to the methods I adopt for covering with gold, and described in the preceding claim, but with the following exceptions, which I shall proceed to enumerate:—First, I dissolve silver in a saturated solution of acetate of ammonia by the aid of the galvanic battery, proceeding as in the instance of gold already described, substituting, however, silver for gold, or I dissolve silver in bromine and alcohol; also with the aid of the galvanic battery, the solution of bromine with alcohol; and silver thus obtained is suffered to remain at rest until a yellowish white precipitate takes place. The fluid portion is decanted, and the remaining precipitate is dissolved in thirty parts its weight of a saturated solution of acetate of ammonia, by being boiled together for about ten minutes. The bromine and silver may be dissolved by the same means in other ammoniacal salts, or in prussiate of potass; but I prefer acetate of ammonia. The solution of silver being obtained, the surface of the metal to be covered with silver must be cleaned as formerly described, and then placed in the vessel, A, at F, and attached to, D, in the vessel, B. A plate of silver must oppose the surface, F, as E, and in like manner be attached to C. The solution of silver is now added to the vessel, A. The battery being excited into action, a few hours is sufficient to give a thin coating of silver; but the time is regulated by the thickness of the deposit required by the operator. A solution may be formed for the above purposes of iodine and silver by dissolving an iodide of silver in prussiate of potass, or any of the ammoniacal salts. The claim here made is for the use of bromine and iodine combined with silver, and in conjunction with voltaic electricity, and applicable to the surfaces enumerated in the description of the fourth part of my invention.

Sixthly, for methods hereinafter mentioned, of covering metallic surfaces with platinum, being applicable to the

purposes enumerated in the fourth part of my invention. Surfaces have hitherto not been attempted to be covered with platinum by the agency of electricity, by any other means than the simple use of the solution of chlorine and platinum, usually termed chloride of platinum. This solution, in conjunction with voltaic electricity, has been used to cover all the useful metals, with the exception of lead; but in no case has this method been successful in obtaining a permanent covering of this metal, want of adhesion always being the result. My improvements consist in the preparation of the solution in the first instance, and in the use of bromine for the first time in conjunction with platinum in the second instance, and for covering the surface of lead with platinum in the third instance. To prepare the solution I procure the yellow powder termed by chemists the platino-bichloride of ammonia, it being procured by combining the chloride of platinum with sal ammoniac. The powder thus obtained is added to sixty times its weight of water, to which three parts of muriatic-acid have been already added, the acid promoting the solution of the yellow powder; the mixture must then be boiled for a few minutes, about ten, when it is fit for use. Another method of preparing the solution consists in dissolving metallic platinum in muriate of ammonia, or sal ammoniac with the aid of the voltaic battery. This is done exactly in the same manner as already recommended to dissolve gold by similar means. Either of these solutions may be used in the vessel, A, in the drawing, proceeding in all other respects as recommended in the description of the fourth part of my invention. When I use bromine, in conjunction with platinum, I procure the metal in a highly comminuted state, the whole being usually termed spongy platinum; bromine, mixed with its bulk of alcohol is added to it, and the whole is stirred or shaken to promote dissolution; the platinum in this state combines with the bromine. The solution of bromine and platinum thus obtained, is combined with half its bulk of

dilute sulphuric-acid containing six times its weight of water. At this stage the solution is ready for use, and may be used exactly as the preceding one. Bromine may also be combined with platinum by using the yellow powder obtained, as already described, and combining it with the alcoholic solution of brómine. Either of these solutions are to be used as for covering surfaces with gold, but substituting a piece of solid platinum for the surface of solid gold, and placing it opposite the surface to be covered with platinum, and in connexion with the plate, c, of the battery. To cover surfaces of lead with platinum, the lead is first cleaned by any of the methods in common use, and then immersed in water containing half an ounce of any of the solutions of platinum to half a gallon of water. The lead must be let remain for six hours in this solution; on removing it the surface will be found to have changed to a dark brown colour; this being in some cases sufficient to protect it from the action of the atmosphere and fluids; but should a more permanent coating be required, it will then be necessary to connect it, while in the solution, with the battery; in this case the solution may be used double the strength. Surfaces of metal thus covered with platinum are applicable for all the purposes already enumerated in the description of the fourth part of my invention, and lead so covered for surfaces used for the negative element or plates of galvanic-batteries. The claim here made is threefold; for the use of the solution above described, in conjunction with voltaic electricity; for the use of bromine combined with platinum, and in conjunction with voltaic electricity; and, for covering lead with platinum, and applying it for the first time to the uses already named.

Seventh, for an improved method of covering metallic surfaces with tin, applicable to the purposes enumerated in the description of the fourth part of my invention. The metallic surface to be covered with tin, is to be cleaned by any of the methods already mentioned as applicable to

other purposes. It is then to be placed at E, in the vessel, A, and connected with, D, in the vessel, F. Another surface of solid tin must be placed in the vessel, A, at E, and connected with, C, in the vessel, B. A solution of acetate of ammonia, or muriate of that salt, or sulphate of soda, (but I prefer the first, it being a saturated solution diluted with half its bulk of water), is placed in the vessel, A, which covers the surface to be tinned. The battery-plates contained in the vessel, B, being excited into action, the tin, at E, is dissolved, and by the same agency is carried across to the opposite surface, on which it is deposited in the solid state. The thickness to be regulated by the wants of the operator. The claim here made is for covering the surfaces enumerated in the description of the fourth part of my invention, with tin, by these particular methods.

Eighthly, for the methods of cleaning the surfaces of iron that are to be covered with copper by the agency of voltaic electricity, and for this method of covering the surfaces with copper when so cleansed. My improvements are as follows:—To clean the iron surface, I attach it by a wire to the platinum end of a voltaic-battery of three pairs of plates, each plate having as much surface as the iron to be cleaned. The surface thus attached is to be placed in the vessel, A, and will be represented by referring to E. Another surface of iron must be attached in like manner to the battery, but to the zinc end of the plates. This surface is also to be placed in, A, and is represented by, F. A saturated solution of sulphate of soda is now to be placed in the vessel, A, covering the iron surfaces. The battery, being excited into action, will now act on the surface, E. In a few minutes the surface will be brightened, should it be malleable iron; but should it be cast iron, the immediate surface will be deprived of its iron, and the carbon contained in it will be exposed. In either case it is ready to be deposited on. To deposit copper on these surfaces, the iron thus cleaned is imme-

diately attached to the zinc end of a battery, having a similar number of plates to that used in the first instance; and a piece of copper is in like manner attached to the opposite or platinum end of the same battery. These surfaces are now immersed in the vessel, A, which should contain a solution of a salt of copper. The cupreus solution may be the acetate, sulphate, nitrate, or the ammonia, acetate of copper. When thus arranged, the iron or carbon surface will receive a coating of copper, the thickness to be regulated by the wants of the operator. Where malleable iron only is to be coated, it is to be cleaned by the following process, which is simpler than the preceding, but requires longer time. The surface to be cleaned is placed in a half saturated solution of sulphate of zinc, which must contain a very small portion of any salt of copper, barely colouring the other fluid. In an hour it will be found that the iron has become cleaned, and has also become covered with a thin film of copper. In this state it is to be attached to the zinc end of the battery, as in the former instance. The claim here made is for these methods of cleaning iron surfaces; and for this regulation of the quantity and intensity of electric force necessary to render iron fit to be deposited on, for the first time pointed out.

Ninth, for a method of producing enriched surfaces applicable to picture and other frames and cornices: also applicable to other interior decorations. These surfaces have usually been enriched by first receiving repeated coating of a substance consisting of whiting and a glutinous matter, termed size; this has then been smoothed or polished into a level state, and then scratched with a pointed instrument into various designs or enrichments. Another method of producing enriched effects, for similar purposes, is by fastening on the smoothed surface a reticulated fabric, termed bobbin-net, of various devices. My improvements consist in producing all manner of enrichments applicable to the above purposes, by the use of em-

bossed or enriched calico, or other similar fabric. The enrichments are produced on the fabric in the first instance by pressing it between rollers or blocks, having the required pattern depicted on their surface, but for the general production of which no claim is made. This fabric is cut into pieces of the required size, and fastened to the surface that it is required to enrich. I shall describe the method to be adopted in covering the surfaces of a picture-frame, it being applicable to all other decorations. The substance of larger picture-frames generally consists of wood. This surface is to receive one coating of a thin-fluid, usually known to carvers and gilders as thin-whiting, when this becomes dry, the same surface is to receive another coating with the brush of the same substance, but rendered much thicker by saturating it with whiting. While the surface of the frame is wet with this coating, the embossed fabric is to be laid carefully on it, and pressed gently down, care being taken that there shall be a sufficient quantity of the thick-fluid on the surface of the frame, so as to allow all the hollow spaces of the embossed fabric to be filled up with it, in order that it may present a solid surface when dry. The surface of the frame thus covered, is now ready to be prepared for gilding or coloured, or to receive additional ornaments of any description; the claim here made, ending at this stage of the preparation of the surface. Devices and enrichments of the same description may be produced by adopting the same method as here described in all other respects; but when the embossed fabric becomes dry, after having been laid on the coating of whiting, it may then be stripped off by raising any of the fabric, and pulling it gradually off the surface of the frame; by proceeding in this manner, the exact transcript of the embossed pattern is left on the surface of whiting, and may be prepared in like manner to be gilt or otherwise treated. There are several fluids and glutinous matters that might be used to fasten this fabric on the surfaces, but I prefer the one that I have

named, but more espesially so if it should be deemed preferable to move the fabric and leave the imprint. The claim here made, is for this method of producing embossed or enriched surfaces on picture and other frames, and cornices, being applicable to other interior decorations.

Tenthly, for the following method of improving the texture of composition used to cast ornaments for picture and other frames and cornices, and applicable to other decorative purposes. The composition for these purposes, is usually made of definite proportions of melted glue and water, with whiting and resin, or pitch in the melted state. My improvement consists in adding to the above materials, caoutchouc or Indian-rubber dissolved in spirits of turpentine, or the menstruum termed asphalte, pyroligenous spirit, or spirit of tar; this addition is made to the usual materials, in the proportion of one pound of caoutchouc to every six pounds of glue used; it may be dissolved in any quantity of the turpentine found convenient. I generally prefer two pounds of the fluid to each pound of the caoutchouc, the proportions of the caoutchouc, for the compositions generally, may be varied with the quality of the glue, the best material requiring a less quantity of the caoutchouc; the object being to give the whole composition additional elasticity and tenuity, and to prevent cracking. The claim here made, is for this first application of caoutchouc for the purposes above enumerated.—In witness whereof, &c.

Enrolled September 21, 1841.

Specification of the Patent granted to JOHN CUTTEN, *of Margate, in the County of Kent, Coal Merchant, for an Improvement in Garden-Pots.*—Sealed November 2, 1839.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said John Cutten, do hereby declare that the nature of the said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following explanation thereof (that is to say):—

My invention of an improvement in garden-pots consists in the manufacture of a double pot, that is to say, that in addition to a garden-pot, as usually made, I form, from the base of the same, an outer or second side, by which a space, of a size in proportion to that of the pot, is made parallel with the inner or first side, into which space it is intended to place water: and inasmuch as garden-pots are manufactured of clay or earthy matter, which is porous, and continues to be porous even after the process of baking in a kiln, so that the water which is placed between the two sides filters through the pores thereof, and such portion as passes through the first or inner side gives nutriment to the plant, and a continued and uniform supply of water is kept up.

In order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the means by which I perform my said improvement. I take of clay, or other earthy matter as I may judge most fitting, a sufficient quantity to make one pot, and placing the same upon a potter's turning lathe, put the treadle in motion, and as the lathe revolves, fashion with my hands a common garden-pot, leaving a certain quantity of the material at the base thereof, which I then proceed to draw up parallel with the side of the inner

pot, thus making the second side, and which I produce to such a height as I think proper, though I prefer generally to bring it about from one-eighth to one-fourth of an inch (according to the size of the pot) below the level of the inner or first side. Now it is the custom to make garden-pots of one peculiar form, still my invention will apply to any shape or pattern whatever.

Now whereas the application of clay and various earths in the formation of garden-pots is known or used, therefore I do not claim any right or privilege in respect of the same. And whereas the manufacture of garden-pots in a potter's lathe is not new, therefore I do not claim any right or privilege in respect of the same; but in the formation of a garden-pot, having double sides, made from a single piece of clay, or other earthy matter, without join of any kind, being, to the best of my belief, new and never before used in the United Kingdom of Great Britain called England, Her Majesty's principality of Wales, and town of Berwick-upon-Tweed, I do declare this to be my specification of the same; and I claim as new and of my invention.—In witness whereof, &c.

Enrolled April 13, 1840.

Specification of the Patent granted to STEPHEN GEORGE DORDOY, *of Blackman Street, in the Borough of Southwark, in the County of Surrey, Chemist, for certain Improvements in the Manufacture of Gelatine, Size, and Glue.*—Sealed October 31, 1839.

To all to whom these presents shall come, &c., &c.—*Now know ye*, that in compliance with the said proviso, I, the said Stephen George Dordoy, do hereby declare, that the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following description thereof, (that is to say) :—

I take all such hides, skins, or other animal substances as are usually employed in the preparation of gelatine, size, and glue, according to the ordinary method, and which are called glue pieces, such being the skins of beasts, or other animal substances from which gelatine is extracted: I take such skins, hides, or other animal substances, and place them in a proper vessel and cover them with cold water, and let them remain some days in such water till they become slightly putrescent; I then take such skins, hide-pieces, or animal substances, and wash them in pure cold water, with stampers, or any other convenient machine or engine, until the water runs off clear. I then put such skins, hides, or other animal substances, into a wooden, earthen, leaden, or other proper vessel, with a cover fitted to exclude the general atmosphere, and cover them with cold water, which I impregnate with enchlorine, chlorous, or chloric-acids, prepared in the manner and proportions as follows:—For every 100 lbs. weight of the skins, hides, or animal substances, I take of the chlorates or chlorides of lime, potass, soda, barytes, or other compounds from which enchlorine, chlorous, or chlorinic-acid may be obtained; but of these I prefer the chlorates of potass or soda, eight ounces of which I dissolve or thoroughly mix in or with two or more gallons of hot or cold water, adding thereto 4 lbs. of hydrochloric or other acids, and stir thoroughly. This mixture I pour into the vessel containing the water and animal substances, stirring the materials continually while the mixture is being added. The animal substances should be kept entirely covered with the impregnated water for twenty-four hours. I find these quantities and proportions sufficient for 100lbs. weight of sheep pieces or the skins of such animals as have thin skins; or other animal substances, taken from oxen, calves, or other animals, or such as have much flesh or fibre about them, will require to be steeped in such impregnated water two or three times, and for

the same number of hours, or until they appear of a uniform transparent whiteness; but after each several steeping in such impregnated water, I thoroughly wash such skins, hides, or other animal substances, in fresh cold water, with stampers, or any other convenient engine or machine, until such cold water runs off clear. All these several immersions are to be continued for 24 hours, and then after being well washed in cold water, by means of stampers or any other convenient engine or machine, they are to be put into any convenient wooden, earthen, leaden, or other proper vessel. Water which has been boiled, and allowed to lower a temperature of about 160 degrees of Fahrenheit's thermometer is then to be poured on to such skins, hides, or other animal substances. The vessel is to be covered, and the temperature of the water kept up to 100° of Fahrenheit, by means of steam, hot air, or any other effectual method; and at the end of from twelve to twenty-four hours, a gelatinous solution will be formed. I strain off the solution of gelatine, and pass it through woolen or other proper filtering material, and then pour on to the same skins, hides, or other animal substances, a fresh supply of hot water, keeping the skins immersed, and at a temperature of 120° of Fahrenheit. After such substances have remained at such a temperature for a certain time, not exceeding twenty-four hours, a further solution will be obtained: this must be run off and filtered, as before mentioned. I again pour more hot water on such animal substances, and raise the temperature of the same to 140° of Fahrenheit, at which temperature I keep them for a time not exceeding twenty four hours; a fresh gelatinous solution being formed is to be run off and filtered, in the manner before mentioned. I then again pour on to the same animal substances fresh hot water, of such a temperature as will leave the said animal substances at a temperature not less than 160° of Fahrenheit, and leaving the said animal substances in the said hot water, for a

certain time, not exceeding twenty-four hours; the solution is to be run off and filtered, in the manner above mentioned, concerning the first mentioned solution. I boil the remaining animal substances with more water, heated by means of stéam, or in any other convenient manner, until all the gelatine is apparently dissolved, stirring such animal substances occasionally, when the solution is then to be drawn off and filtered, as hereinbefore mentioned. All these several solutions may be mixed and used as desired, or the aqueous parts may be evaporated, so as to bring the gelatine to any desired consistence, and used, as commonly, in the manufacture of glue, having all the properties of gelatine, size, or glue. Now I do not claim any of the particular vessels or apparatus, above mentioned, nor the washing of the animal substances by any particular engine or machine; but what I claim as my invention, is the use or application of euchlorine, chlorous, or chloric-acids prepared from the chlorates or clorides of lime, potass, soda, barytes, of other compounds from which euchlorine, chlorous, or chloric-acid, may be obtained by the action of hydrochloric, or other acids, in the above, or any other proportion, or in any other manner, for the purposes of the manufacture of the preparations called gelatine, size, or glue. Although I have, in the above specification, described only one mode of preparing and applying the impregnated liquid, and which I have found most effectual in practice, yet the chlorates or chlorides may be applied, in solution or mixture, to the skins, hides, or other animal substances, and the hydrochloric or other acids may be added, after the said solutions or mixtures have been mixed with the said skins, hides, or other animal substances. And having thus described the nature of my invention, I declare this to be a true specification thereof.—In witness, whereof, &c.

Enrolled April 30, 1840.

ALTERATIONS AND DISCLAIMERS IN SPECIFICATIONS.

In the Matter of a Patent granted to Abel Morrall, *of the Parish of Studley, in the County of Warwick, Needle Maker, for certain Improvements in the Making or Manufacturing of Needles, and in the Machinery or Apparatus Employed therein,* Sealed January 3, 1839; *and which Patent the said* Abel Morrall *did Assign to* Thomas Moore Bartleet, William Bartleet, *and* Charles Bartleet, *all of Redditch, in the County of Worcester, Needle Makers.*

Disclaimer and memorandum of alterations of that part of the title of the said invention, and of part of the specification thereof, entered by the said Thomas Moore Bartleet, William Bartleet, and Charles Bartleet, pursuant to the act.

We, the said Thomas Moore Bartleet and Charles Bartleet, do hereby declare that since the enrolment of the said specification, we have been advised by counsel, that the peculiar circumstances under which the machine represented by fig. 4, (in the drawings annexed to that specification,) had been used before the date of the said letters patent; not only in respect to the said machine, fig. 4, but also in respect to the improvement thereon, which is contained in the machine represented by figs. 1, 2, and 3, in the said drawings, and described and claimed in the said specification as the said Abel Morrall's most improved construction of machine. Wherefore, for the reasons aforesaid, we do hereby disclaim so much of the title of the said invention as implies that it is a plurality of improvements in the making or manufacturing of needles, and in the machinery or apparatus employed therein. And we do hereby limit and confine the said invention to "a certain improvement in machinery, or

apparatus employed in the making or manufacturing of needles;" that improvement being certain parts of the machinery represented in figs. 1, 2, and 3, of the drawings annexed to the said specification, which said parts are respectively marked with the letters, *g*, *h*, *i*, and *k*, in the said figures; and by which said parts the wires, whereon the needles are spitted or strung, are made to turn round in an opposite direction to that in which the needles are at the same time swung round about the said wires, thereby causing the wires to produce additional friction in the eyes of the needles, because they are subjected to the double effect of their own friction against the rough surface of the wire as they fly round about the same, and of the abrasion of that surface by the wires turning the reverse way. And we do hereby disclaim all parts of the said specification and of the drawings thereto annexed, except those parts thereof which describe, and represent, and claim the said parts, *g*, *h*, *i*, and *k*, of the machinery represented in figs. 1, 2, and 3, and the operation, and properties, and advantages of those parts, that is to say:—In the said title we do hereby alter the words "certain improvements" to "a certain improvement," and we disclaim and expunge the words "and in the:" and the word "therein" we alter to "in;" also the words "the making or manufacturing of needles." we alter and transpose, to become the concluding words in the said titles, in order that the title of the said invention may henceforth stand as follows, *videlicit*, "a certain improvement in machinery or apparatus employed in the making or manufacturing of needles." And in the said specification, we do hereby disclaim and alter the words hereinafter recited at ten several places, following one after another in due succession, in the said specification; *videlicit*:—The first place is immediately after the preamble thereof, where it reads,—"my improvements in making or manufacturing needles, and in the machinery or apparatus to be employed therein, consist in

an improved mode of clearing and finishing the eyes of sewing needles." We disclaim and alter those words, so that they may henceforth stand as follows; *videlicit*:—"My improvements consist in certain additions to the machine represented in fig. 4 of the said drawings, which machine had been used, before the date of the said letters patent, for clearing and finishing the eyes of sewing needles." The second place is the following words, which we disclaim and wholly expunge,—"as I do not propose any variation." In the other parts of the operations of manufacturing needles, it will be unnecessary for me to describe the usual modes by which that manufacture is conducted. I shall, therefore, confine this specification or description to my improved process, and to the construction of the machinery by which I effect the object above stated: "I take any convenient number of needles, in any state or states of their manufacture, after the eyes have been pierced, punched, or otherwise formed;" and the third place, is in the next succeeding passage, where it reads,—"through the eyes of a series of those needles I pass a fine wire, which wire I prefer to be of hardened steel, the surface of which may be roughed or indented by a file or otherwise." In that passage we disclaim and expunge the word "I;" also the words, "which wire I prefer to be;" and the word "may" we alter to "must;" and the word "hardened" we transpose to the end of the sentence, and alter the same to,—"and then hardened," in order that the said passage may henceforth stand,—"through the eyes of a series of these needles pass a fine wire of steel, the surface of which must be roughed or indented by a file or otherwise, and then hardened." The fourth place is the next succeeding passage, wherein we disclaim and wholly expunge the following words,—"or the wire may be made with an angular edge or edges charged with a composition of some grinding or polishing material, as emery and oil, or it may be smooth wire, or it is possible that some string or cord

of animal, mineral, or vegetable matter, charged with a grinding or polishing material, might answer the purpose." The fifth place is the next succeeding passage, where it reads,—"when a series of these needles have been thus spitted or strung, I then distend the wire, string, or cord, carrying in arms or bearings in any convenient machine or apparatus, for the purpose of giving to the needles a very considerable shaking or reciprocating agitation, or it may be a revolving motion, when the rubbing of the interior of the eyes of the needles against the wire, string, or cord on which they are spitted or strung. In that passage we disclaim the word "I;" also the words, "string or cord:" at both the places where those words occur, and the words arms, or bearings; "in any convenient," we alter to "the." We disclaim and expunge the words "or apparatus;" also the words "shaking or;" likewise the words "agitation or it may be a," in order that the said passage may henceforth stand, "when a series of these needles have been thus spitted or strung, then distend the wire carrying the needles in the meantime, for the purpose of giving to the needles a very considerable reciprocating revolving motion, when the rubbing of the interior of the eyes of the needles against the wire on which they are spitted or strung." The sixth place is in the next succeeding passages, where it reads, "Fig. 1, represents a front view of my most improved construction of machine:" we therein disclaim and alter the words, "my most" to "the," in order that the said passage may henceforth stand,—"Fig. 1, represents a front view of the improved construction of machine." The seventh place is further on in the said specification, where it reads, —"between which wheels or arms are distended the wires, strings, or cords:" we therein disclaim and expunge the words, "strings or cords." The eighth is in the next succeeding passage, where it reads,—"a more simple plan of the machine is represented at fig. 4, by means of which, in the first instance, I will describe the mode of conducting the operation:—The needles

having been spitted or strung upon the wires, as said, which wires I prefer to be of hardened steel." In that passage, the words, "I prefer," we alter to, "are." And, whereas, if all the words which relate to fig. 4, were to be wholly expunged from the said specification, the mode of conducting the operation with the machine, figs. 1, 2, and 3, would be left imperfectly described; and as we wholly disclaim the machine, fig. 4, we, therefore, alter the last-recited passage, so that it may henceforth stand,—"a more simple plan of the machine is represented at fig. 4, by means of which, in the first instance, I will describe the mode of conducting the operation with the machine, figs. 1, 2, and 3, but no part of the machine, fig. 4, is claimed, and only the parts marked, *g*, *h*, *i*, and *k*, in figs. 1, 2, and 3, are claimed: "The needles having been spitted or strung upon the wires, as said, which wires are to be of hardened steel." The ninth place is the following words, which we disclaim and wholly expunge,—" and they may be supported in the middle by the standard-rods, *e*, *e*, extending from the axle, *b*, having a screw or socket at the end to receive the wire." The tenth place is in the concluding passage of the said specification, whereit reads,— I do not intend to confine myself to such peculiar construction of machine, as the effect might be obtained by a variety of other forms of apparatus, in which needles, being spitted or strung upon wires or strings, are submitted to the quick agitation, might have their eyes cleared, polished, or burnished, by such means, and therefore should consider any such variation as embracing the principles of my invention, as set out above." In order effectually to disclaim the machine, fig. 4, we alter that passage to stand thus: "No claim is made to any such parts of the said machine, figs. 1, 2, and 3, as are also parts of the machine, fig. 4, the latter machine being thereby wholly disclaimed, and the claim is hereby limited and confined to the parts, *g*, *h*, *i*, and *k*, of the machine, figs. 1, 2, and 3,

which parts cause the wires, whereon the needles are spitted or strung, to turn round in an opposite direction to that in which the needles are at the same time swung round about the said wires. And, lastly, in the drawing annexed to the said specification, we do hereby disclaim the fourth figure drawn thereon, together with the words, fig. 4, which are written over that fourth figure, (and the letters of reference marked on that same figure,) as representing any portion of the invention claimed under the said letters patent, notwithstanding that the said fig. 4, is to be retained in the drawing, for the purpose of explaining the mode of conducting the operations that are to be performed by the other machine, figs. 1, 2, and 3.—In witness, whereof, &c.

Enrolled March 26, 1841.

NOTICE OF EXPIRED PATENTS.

(*Continued from page* 251.)

Thomas Tyndall, of Birmingham, Gentleman, for improvements in the machinery to be employed in making nails, brads, and screws. Communicated by a foreigner residing abroad.—Sealed December 18, 1827.

John George, of Chancery Lane, Middlesex, Esquire, Barrister-at law, for preserving decked ships or vessels, so as to render them less liable to dry rot, and for preserving goods on board such ships and vessels from damage by heat.—Sealed December 18, 1827.—(*For copy of specification, see Repertory, Vol.* 8, *third series, p.* 129, 192, and 257.)

Thomas Stanhope Holland, of the city of London, Esquire, for combinations of machinery for generating and communicating power and motion applicable to propelling of fixed machinery, as also floating bodies, carriages, and other locomotive machines and improvements.—Sealed December 19, 1827.—(*For account of specification, see Repertory, Vol.* 8, *third series, p.* 17.)

William Harland, M.D., of Scarborough, for improvements in apparatus or machinery for propelling locomotive carriages, which improvements are also applicable to other useful purposes.—Sealed December 21, 1827.—(*For account of specification, see Repertory, Vol.* 8, *third series, p.* 151.)

Charles Augustus Ferguson, of Mill Wall, Poplar, Mast Maker, and James Falconer Atlee, of Prospect Place, Deptford, Kent, Gentleman, for improvements in the construction of made masts.—Sealed December 22, 1827.—(*For account of specification, see Repertory, Vol. 8, third series, p.* 155.)

William Hale, of Colchester, Merchant, for improvements in machinery or apparatus for propelling vessels.—Sealed December 27, 1827.—(*For account of specification, see Repertory, Vol. 8, third series, p.* 22.)

William Gossage, of Leamington Priors, Warwick, Chemist, for improvements in the construction of cocks for the passage of fluids.—Sealed January 2, 1828.

Thomas Botfield, of Hopton Court, Shropshire, Coal and Iron Master, for improvements in making iron, or in the method or methods of smelting and making of iron.—Sealed January 2, 1828.

James Hall, Junior, of Ardsall, near Manchester, Dyer, for improvements in dyeing piece goods by machinery.—Sealed January 2, 1828.

Joseph Clisild Daniell, of Stoke, Wiltshire, Clothier, for improvements in dressing cloths, and in the machinery applicable for that purpose.—Sealed January 2, 1828.

William Morley, of the town and county of the town of Nottingham, Lace Manufacturer, for improvements in, and additions to, certain machines or machinery now in use for making lace or net commonly called bobbin or twist net lace.—Sealed January 9, 1828.

James Andrew Hunt Grubbe, of Stanton Saint Bernard, Wilts, Clerk, for a transmitting heat wall for the ripening of fruit.—Sealed January 8, 1828.—(*For account of specification, see Repertory, Vol. 8, third series, p.* 81.)

James Gilbertson, of Hertford, Hertfordshire, Grocer, for an improvement or improvements in the construction of furnaces by which they consume their own smoke.—Sealed January 15, 1828.

Charles Hooper, of Spring Gardens, in the parish of Marston Bigot, Somersetshire, Shear Grinder, for an improved machine for shearing and cropping woollen and other cloths.—Sealed January 15, 1828.

John Evans, the Younger, of Morton Mills, near Wallingford, Berks, Paper Maker, for certain improvements on steam-engines.—Sealed January 15, 1828.—(*For account of specification, see Repertory, Vol. 8, third series, p.* 226.)

Joseph Blades, of Clapham, Surrey, Gentleman, for an improvement in the water-proof stiffening for hats. Communicated by a foreigner residing abroad.—Sealed January 15, 1828.

William Newton, of Chancery Lane, Holborn, Civil Engineer and Mechanical Draftsman, for an improved surgical chair-bed, with various appendages, designed for useful purposes.—Sealed January 15, 1828.

George Daniel Harris, of Field Place, near Stroud, in Gloucestershire, Clothier, for his improvements in dressing and preparing woollen yarns, and in cleansing, dressing, and finishing woollen cloths, and other fabrics, and in the apparatus for performing the same.—Sealed January 15, 1828

Thomas Falconer Atlee, of Prospect Place, Deptford, Kent, Gentleman, for improvements on bands or hoops, for securing made or other masts, bowsprits, and yards, and applicable to other purposes.—Sealed January 15, 1828.—(*For account of specification, see Repertory, Vol. 8, third series, p. 664.*)

William Erskine Cochrane, of Regent Street, London, Esquire, for improvements in certain apparatus for cooking, and other purposes.—Sealed January 15, 1828.—(*For account of specification, see Repertory, Vol. 8, third series, p. 221.*)

PATENTS GRANTED FOR SCOTLAND,

From August 23, to September 22, 1841.

William Lewis Rham, of Winkfield, in the county of Berks, Clerk, for certain improvements in machinery or apparatus for preparing land, and sewing or depositing grain, seeds, and manure.—Sealed August 23, 1841.

Nathan Waddington, of Hulme, in the county of Lancaster, Engineer, for certain improvements in the construction of boilers and boiler-furnaces.—Sealed August 25, 1841.

John Cox, of George Mills, Edinburgh, Tanner and Glue Manufacturer, for improvements in apparatus for assisting or enabling persons to swim or float and progress in water.—Sealed August 25, 1841.

James Sidebottom, of Waterside, in the parish of Glossop, in the county of Derby, Manufacturer, for certain improvements in machinery or apparatus for preparing cotton and other fibrous substances for spinning.—August 30, 1841.

Francis William Gerish, of East Road, City Road, in the county of Middlesex, Patent Hinge Maker, for improvements in locks, keys, and other fastenings for doors, drawers, and other such purposes.—Sealed September 2, 1841.

Samuel Hardman, of Farnworth, near Bolton, in the county of Lancaster, Spindle and Fly Maker, for certain improvements in machinery or apparatus for roving and slubbing cotton and other fibrous substances.—Sealed September 3, 1841.

Louis Lachenal, of Tichfield Street, Soho, Mechanic, and Antoine Vieyres, of 40, Pall Mall, Watch Maker, both in the county of Middlesex, for improvements in machinery for cutting cork.—Sealed September 7, 1841.

Joshua Taylor Beale, of East Greenwich, in the county of Kent, Engineer, and Benjamin Beale, of the same place, Engineer, for certain improvements in steam-engines.—Sealed September 8, 1841.

Charles Sneath, of Nottingham, Lace Manufacturer, for certain improvements in machinery for the making or manufacturing of stockings or other kinds of loop-work.—Sealed September 13, 1841.

Lawrence Kortright, of Oak Hall, East Ham, in the county of Essex, Esquire, for certain improvements in treating and preparing the substance commonly called whalebone, and the fins and such like other parts of whales, and rendering the same fit for various commercial and useful purposes. Communicated from a foreigner residing abroad.—Sealed September 14, 1841.

William Newton, of 66, Chancery Lane, in the county of Middlesex, Civil Engineer, for certain improvements in machinery for making pins and pin-nails. Communicated by a foreigner residing abroad.—Sealed September 15, 1841.

Thomas Craddock, of Broadheath, in the county of Radnor, Farmer, for certain improvements in steam engines and boilers.—Sealed September 16, 1841.

William Newton, of 66, Chancery Lane, in the county of Middlesex, Civil Engineer, for certain improvements in looms for weaving. Communicated by a foreigner residing abroad. — Sealed September 17, 1841.

William Scamp, of No. 11, Upper Charlton Terrace, near Woolwich, in the county of Kent, Surveyor, for an application of machinery to steam-vessels for the removal of sand, mud, soil, and other matters from the sea, rivers, docks, harbours, and other bodies of water.—Sealed September 21, 1841.

Thomas William Berger, of Upper Homerton, Hackney, in the county of Middlesex, Gentleman, for improvements in the manufacture of starch.—Sealed September 22, 1841.

LIST OF NEW PATENTS.

Jean Louis Alphonse Petigars, of Brewer Street, Golden Square, Gentleman, for improvements in the construction of presses. Communicated by a foreigner residing abroad.—Sealed September 24, 1841.—(*Six months.*)

Hugh Lee Pattinson, Bensham Grove, Gateshead, Durham, Manufacturing Chemist, for improvements in the manufcture of white-lead, part of which improvements are applicable to the manufacture of magnesia and its salts.—Sealed September 24, 1841.—(*Six months.*)

Frederick Brown, of Luton, Bedford, Ironmonger, for improvements in stoves or fire-places.—Sealed September 24, 1841.—(*Six months.*)

Theodore Frederick Strong, of Goswell Road, Engineer, for certain improvements in locks and latches, —Sealed September 28, 1841.—(*Six months.*)

Samuel Stocker, of Barford Street, Islington, Engineer, and George Stocker, of Birmingham, Cock Founder, for improvements in machinery and apparatus for raising, forcing, conveying, and drawing off liquids. —Sealed September 28, 1841.—(*Six months.*)

John While, of Burton, in the Wolds of Leicester, Farmer, for an improved horse-hoe, for use in agricultural pursuits.—Sealed September 29, 1841.—(*Four months.*)

Joseph Miller, of Monastry Cottage, East India Road, Engineer, for an improved arrangement and combination of certain parts of steam-engines used for steam navigation.—Sealed September 29, 1841.—(*Six months.*)

Edward Welch, of Liverpool, Architect, for certain improvements in the construction of bricks.—Sealed September 30, 1841.—(*Six months.*)

William Hirst and Joseph Weight, of Leeds, Clothiers, for certain improvements in the machinery for manufacturing woolen cloth, and cloth made from wool and other materials.—Sealed October 7, 1841.—(*Six months.*)

Thomas Wells Ingram, of Birmingham, Manufacturer, for improvements in shears and other apparatus for cutting, cropping, and shearing certain substances. Partly communicated by foreigner residing abroad.—Sealed October 7, 1841.—(*Six months.*)

Joseph Clisild Daniell, of Tiverton Mills, Bath, for improvements in the manufacture of manure, or a composition to be used on land as a manure.—Sealed October 7, 1841.—(*Six months.*)

Mathias Nicolas La Roche Barré, of Saint Martin's Lane, Manufacturer of Cotton, for an improvement in the manufacture of a fabric applicable to sails and other purposes.—Sealed October 7, 1841.—(*Six months.*)

Marcus Davis, of New Bond Street, Optician, for

improvements in the means of ascertaining the distances vehicles travel.—Sealed October 7, 1841.—(*Six months.*)

THOMAS BIGGS, of Leicester, Merchant, for improvements in securing hats, caps, and bonnets, from being lost by the effect of wind, or other causes.—Sealed October 7, 1841.—(*Six months.*)

BENJAMIN AINGWORTH, of Birmingham, Gentleman, for improvements in the manufacture of buttons.—Sealed October 7, 1841.—(*Six months.*)

JOHN JONES, of SMETHWICK, near Birmingham, Engineer, for certain improvements in steam-engines, and in the modes or methods of obtaining power from the use of steam.—Sealed October 7, 1841.—(*Six months.*)

JOHN HARWOOD, of Great Portland Street, Middlesex, Gentleman, for an improved means of giving expansion to the chest.—Sealed October 7, 1841.—(*Six months.*)

WILLIAM NEWTON, of Chancery Lane, Civil Engineer, for certain improvements in engines to be worked by gas, vapour, or steam. Communicated by a foreigner residing abroad.—Sealed October 14, 1841.—(*Six months.*)

MOSES POOLE, of Lincoln's Inn, Gentleman, for improvements in fire-arms. Communicated by a foreigner residing abroad.—Sealed October 14, 1841.—(*Six months.*)

EDWARD MASSEY, of King Street, Clerkenwell, Watch Maker, for improvements in watches.—Sealed October 14, 1841.—(*Six months.*)

HENRY ROSS, of Leicester, Worsted Manufacturer, for improvements in combing and drawing wool, and certain descriptions of hair.—Sealed October 15, 1841.—(*Six months.*)

JUNIUS SMITH, of Fen Court, Fenchurch Street, Gentleman, for improvements in machinery for manufacturing cloths of wool and other fibrous substances. Communicated by a foreigner residing abroad.—Sealed October 20, 1841.—(*Six months.*)

JOHN BRADFORD FURNIVAL, of Street Ashton, Farmer,

for improvements in evaporating fluids, applicable to the manufacture of salt, and to other purposes where evaporation of fluids is required.—Sealed October 20, 1841.—(*Six months.*)

HENRY DAVIES, of Birmingham, Engineer, for certain improved tools or apparatus for cutting or shaping metals and other substances.—Sealed October 21, 1841.—(*Six months.*)

THOMAS JONES, of Varteg Forge, near Pontypool, Monmouth, Enginer, for improvements in the construction and arrangement of certain parts of marine and stationary steam-engines.—Sealed October 21, 1841.—(*Six months.*)

JAMES WHITWORTH, of Bury, in the county of Lancaster, Manufacturer, and HUGH BOOTH, of the same place, Machine Maker, for certain improvements in looms for weaving.—Sealed October 21, 1841.—(*Six months.*)

MARTYN JOHN ROBERTS, of Brynycaeran, Carmarthen, Gentleman, and WILLIAM BROWN, of the city of Glasgow, Merchant, for improvements in the process of dyeing various matters, whether the raw material of wool, silk, flax, hemp, cotton, or other similar fibrous substances, or the same substances in any stage of manufacture, and in the preparations of pigments or painters' colours.—Sealed October 26, 1841.—(*Six months.*)

THOMAS HOLCROFT, of Nassau Street, Gentleman, for an improved portable safety-boat or pontoon. Communicated by a foreigner residing abroad.—Sealed October 28, 1841.—(*Six months.*)

THE

REPERTORY

OF

PATENT INVENTIONS.

No. XCVI. NEW SERIES. — DECEMBER, 1841.

Specification of the Patent granted to ANDREW MCNAB, *of Paisley, North Britain, Engineer, for certain Improvements in the Manufacture of Bricks.*—Sealed May 11, 1841.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—*Now know ye*, that in compliance with the said proviso, I, the said Andrew McNab, do hereby declare, that the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):

My invention relates to certain improvements in machinery used in the manufacture of bricks; and in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the drawing hereunto annexed, in which the same letters of reference are used to indicate the same parts in the various figures.

Description of the Drawing.

Fig. 1, represents an elevation of a machine constructed according to my invention.

Fig. 2, is a section of fig. 1.

Fig. 3, shews an end view in elevation, with one of the side plates removed to shew the interior of the pug-mill, which, however, is represented to be square, but when complete for use, the angles are fitted up with wood, so as to form the interior into nearly a cylindrical vessel, it being somewhat larger or bell-mouth at the upper part.

Fig. 4, shews a plan of the lower part of the machinery.

Fig. 5, shews a plan of the wheel and apparatus for working the plungers for removing the bricks from the moulds as they are formed, and also for causing the sliding-moulds to pass alternately under and from the pug-mill, in order to receive brick-earth, and then to have the bricks removed from the moulds.

Fig. 6. shews a plan of the bottom of the pug-mill, having two openings through which the brick-earth is alternately forced into the mould by means of the machine-blades or knives of the pug-mill.

Fig. 7, shews a section of the sliding frame of moulds. *a*, is the main shaft, which turns in a cup or bearing at its lower end, at *b*, and in a bearing above, at *c*, as is shewn. *d*, *d*, are the external plates of the pug-mill, the four angles being, as before stated, filled in with wood or other suitable material, so shaped as to produce the interior of a cylindrical form; such filling of the angles being affixed by screw-bolts, or other convenient means, to the side plates. The knives or inclined blades of the pug-mill are of the ordinary kind; and it should be remarked, that at the point where the shaft, *a*, passes through the bottom of the pug-mill, at *e*, there is a projecting collar, a^1, formed on the axis or shaft, *a*; and in order to prevent the clay passing to the axis, *a*, below the collar, a^1, where it passes through the bottom of the pug-mill, in which the axis or shaft, *a*, turns, there are slits or openings, *f*, *f*, through the bottom of the pug-mill, by which means any clay, which might possibly get under the collar, and the surface on which it moves, would not pass to the axis or shaft, *a*,

where it passes through the bottom of the pug-mill, but would be caused to descend through the openings, *f*, *f*. The clay or brick-earth, in order to fill the moulds, is forced through the openings, *g*, *g*, in the bottom of the pug-mill, such openings being of the size, at their lower parts, of the moulds, the upper edges of the openings, *g*, being bevelled off, as is shewn, to facilitate the passage of the clay in the rotation of the knives or blades on the shaft or axis, *a*; and it will be understood, that only one of the moulds, *h*, *h*, is under the pug-mill at one time, the parts being so arranged and caused to work, that there will be one mould under the pug-mill coinciding with one of the openings, *g*, and consequently being filled with brick-earth, whilst the other mould is in a position to have its brick removed. The nature of the sliding-frame of moulds, *h*, *h*, being clearly shewn by the drawing, its construction will readily be understood; and I usually form the inner surfaces of the moulds of brass or wood, and at the edges, *i*, *i*, I apply plates of steel, as is shewn. *j*, is a bevelled cog-wheel, which is affixed to the axis or shaft, *a*, *a*, and it receives motion from a steam-engine, or other power, by means of the shaft and bevel-wheel, *k*. On the upper surface of the wheel, *j*, is affixed a curved inclined plane, j^1, which works the pistons or plungers, *l*, which form the bottoms of the moulds, and are also the means by which the bricks are removed out of the moulds. The pistons or plungers, *l*, *l*, are raised by means of the stems, *m*, affixed to the undersides of the pistons or plungers, such stems having pins, *n*, *n*, affixed thereto, which move in slots in the projections, *o*, *o*, affixed to or forming part of the sliding frame of moulds, as is shewn, and on each of the pins, *n*, is applied a friction-roller, under and against which the inclined plane, j^1, moves and causes the piston or plunger to rise, as will readily be traced on examining the drawing. On the upper surface of the wheel, *j*, is affixed an axis or pin, *q*, on which is applied a friction-roller, p^1; and in the revolution of the axis, *a*, this friction-roller

works against the downward projections, h^1, of the frame of the sliding-moulds, h, and by such means causes the frame, h, to move to and fro, thus bringing the moulds, h, alternately under their respective openings, g, in the bottom of the pug-mill, and yet allowing the sliding-frame of moulds to remain stationary for a short time, when moved into position, in order to allow time for the filling one of the moulds and for discharging the other. The various figures of the drawing shew the parts in the machinery to be in such a position, that the left hand mould is about to be delivered, and the right hand mould is being filled. At each end of the sliding-frame of moulds are projecting surfaces, q, q, and a board fixed on its edge, as is shewn. The object of these projections is to receive pallet-boards, at c, as is shewn; and when the brick has been raised out of a mould, as is indicated by dotted lines, a person attending the machine places a board, s, behind the back, and causes it to slide off the plunger or piston on to the pallet, r; and the continued revolution of the axis, a, causes the sliding-frame of moulds, h, h, to move, by which the left hand mould is brought under its opening, g, to be filled, and the right hand mould is moved outwards into a position to be delivered of its brick by the movement of the curved inclined plane under the stem of the piston or plunger of that mould.

I would remark, that care should be taken to occasionally throw water into the moulds and on to the pistons, and a small quantity of sand on to the pistons or plungers. The drawing very clearly shews the manner in which the various parts go together, as well as the nature or construction of the parts themselves; but I have not shewn the screw-bolts by which the fastenings are made; but the whole will readily be understood and constructed by a workman from the drawing, aided by the description above given.

Having thus described the nature of my invention, and

the manner in which the same is to be performed, I would remark, that I make no claim to any of the parts of the machinery separately, nor do I confine myself to the precise details shewn and described, provided the peculiar character of the machinery be retained. And I would wish it to be understood that what I claim is, First, the mode of applying a sliding-frame of moulds under a pug-mill, with a bottom, in which are formed openings to correspond with such moulds, through which openings the moulds are filled by the revolution of the knives or blades of the pug-mill, as above described; and,

Secondly, I claim the mode of moving a sliding-frame of moulds, and working the pistons or plungers of such moulds, by the axis of the pug-mill passing through the sliding-frame of the moulds, *h*, and by means of the wheel, *j*, the inclined plane, j^1, and the crank-pin, *p*, as above described.—In witness whereof, &c.

Enrolled November 11, 1841.

Specification of the Patent granted to John Condie, *Manager of Blair Iron Ayr Works, in the Parish of Dalry, in the County of Ayr, for Improvements in Applying Springs to Locomotive, Railway, and other Carriages.*—Sealed November 27, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said John Condie, do hereby declare that the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention relates to a mode of applying springs

and levers in such manner as not only to give all the benefit and advantages afforded by the method now in use, but also to effect the uniform continuity of the pressure made to bear on the driving or other wheels of locomotive and other carriages, and promote the constant adhesion of the driving or centre wheels to the rails or road. And in order to give the best information in my power, I will describe the drawings hereunto annexed. But I would first remark, that it is of great importance in applying springs to locomotive carriages, or locomotive engines, having six wheels, that more of the weight should be borne by certain of the wheels than by other of the wheels; and as the invention more particularly relates to locomotive carriages, than to other carriages having six wheels, I will confine my description thereto, as a workman, understanding the invention as applied to such purpose, will readily apply the invention, when desired, to other carriages having six or more wheels, my invention only being applicable to carriages having six or more wheels.

Description of the Drawings.

Figs. 1, 2, 3, and 4, shew various methods of carrying out my invention, each having for its object not only to cause the desired proportion of the whole weight of a locomotive engine to be carried by the driving wheels, but also to promote the uniform continuity generally; and even when the carriage or engine is in motion, and when inequalities or unevenness of the surface travelled over exists, of the weight to be borne by the driving and other wheels, in order to obtain for the driving-wheels a constant or increased adhesion to the rails as possible. Fig. 1, shews so much of one side framing of a locomotive carriage as will enable me to explain the nature of my invention, and one mode of performing the same. The engine or carriage is suspended from four points of bearing, *a*, *a*, two of which are shewn, and two similar ones

are applied to the other side framing of the engine. On the axes or points of suspension, *a*, *a*, are placed levers, *b*, *b*, such axes, *a*, being affixed to the projection, *c*, *c*, of the framing. One end of each of the levers, *b*, is connected with the spring, *d*, there being, according to this arrangement, only one spring used on each side of the locomotive engine; and such spring is applied to the bearing of the driving-wheel by the spring-pin or bearing-rod, *g*, and the elasticity thereof is communicated to the other wheels by bearing-rods, *f*, *f*, from the other sides of the bars, *b*, is connected with the spring, the motion of the two levers, *b*, being connected by means of the rod, *h*, as is shewn; and it will be evident, that the quantity of weight borne by the driving-wheels will depend on the position of the axes of the levers, *b*, whether they are nearer to, or further from, those ends of the lever, *b*, which are attached to the spring, *d*, so that in carrying out my invention, the axle of the lever, *b*, is to be placed at a greater or less distance from those ends of the lever, *b*, which are attached to the spring, *d*, according to the degree of weight desired to be borne by the several wheels.

Fig. 2, shews another arrangement of parts for obtaining the same result, and acting on like principles; and the parts are marked with the same letters of reference, so far as similar parts are used, the principal difference being in the position of the spring, *d*, of the levers, *b*, *b*, by which the connecting-rod, *h*, is dispensed with.

Fig. 3, shews another arrangement, having two additional levers, *h*, *h*, to each spring, as is shewn; the other parts acting in a similar manner to what has been before described.

Fig. 4, shews an arrangement where one spring is used on each side of the locomotive carriage to the driving-wheels, whereby so much of the weight of the locomotive coupled engine as is borne by the four driving-wheels, will be equalized on each side by using only one spring for two wheels.

Having thus described the nature of my invention, and the manner of performing the same, I would remark, that it will be evident that the details by which my invention may be carried out, may be varied, so long as the peculiar character of the mode of applying springs be retained; but what I claim is the mode of applying springs to locomotive and rail-way and other carriages, whereby the desired proportion of the weight having been caused to bear on the driving or other wheels, the uniform continuity of that proportion is effected, and the constant adhesion of the driving or centre wheels to the rails or road is promoted.—In witness whereof, &c.

Enrolled May 27, 1841.

Specification of the Patent granted to THOMAS ROBINSON WILLIAMS, *of Cheapside, in the City of London, Gentleman, for certain Improvements in Obtaining Power from Steam and other Elastic Vapours or Fluids, and for the Means Employed in Generating such Vapours or Fluids, and also for Using these Improvements in conjunction with Distillation or Evaporation, and other Useful Purposes.*—Sealed April 15, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—*Now know ye*, that in compliance with the said proviso, I, the said Thomas Robinson Williams, do hereby declare, that the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention consists in different arrangements of machinery, both for obtaining power from steam or other

elastic vapours in their passage from the boilers or vessels in which they may be generated or produced to the cylinders of common engines, as is also applicable, with nearly the same arrangement, to being usefully employed as a simple, distinct, and separate engine. These arrangements may be applied to all kinds of boilers or generators; but it is believed will be found most advantageously used in conjunction with the form of the boiler hereinafter described.

Description of the Drawing.

A, fig. 1, may be supposed to be the circular top of a common boiler. *a*, is the water-line therein: at the top of this boiler is inserted the cylinder, B, having two ends, C and D, forming the chamber, E, which should be about half or two-thirds the capacity of the cylinder of the steam-engine, with which it communicates by the steam pipe, F. This engine is supposed to be working expansively, and to be furnished with the usual slide-valves for that purpose. G, is a wheel, having cycloidal detent-teeth upon its periphery; and *b*, is its axis or arbor which is supported at its lower end upon a steel-point, at *c*, secured in the bottom-plate, D, and the upper end *d*, of the shaft, *b*, is made to pass through the upper plate, C, and common stuffing-box, *e*. *f*, is a small but strong bevelled pinion fixed upon the end of the shaft, *b*, above the stuffing-box, *e*, and communicates or transmits the power of the wheel, G, to the bevel-wheel, *g*, which may be of such size as to give any required velocity to another shaft, *h*. It will be seen, that the bottom end of the cylinder, B, is cast of greater thickness than the other parts, forming a rim, *i*, *i*, around its lowest inside edge, somewhat wider perpendicularly than the thickness of the detent-wheel, G. The inner side of this rim is to be accurately turned out before the plate, D, is screwed to it, so that the detent-wheel, G, shall be made to fit nicely within it, but without touching in any part. The description and intention of this will be better seen by reference to fig. 2, where the

lower end of the rim, *i, i*, upon the cylinder, together with the detent-wheel, G, are shewn in a horizontal position, with the plate, D, removed. Through this rim, *i, i*, are a convenient number of very narrow or rather thin slits, 1, 2, &c. (the number and width of which depend upon the quantity of steam intended to pass through them); these slits are sewed on or cut in a slanting direction nearly tangental to the periphery of the wheel, G, and opposed to its detent-teeth. *m, m, m*, are screw-holes by which the plate, D, is attached to the rim, *i, i*. By returning again to fig. 1, it will now be seen that the steam in its passage from the boiler to the chamber, E, and the steam-pipe, F, must pass through the slits or orifices, 1, 2, 3, &c., in the direction of the arrows, and impinge with great force upon the teeth of the wheel, G, thereby communicating a high velocity and great amount of power before the steam in the cylinder, E, arrives at the same degree of pressure as in the boiler, A, and the time again arrives for the slide-valve to open for the admission of steam from the chamber to the cylinder of the steam-engine. It will readily be seen that this chamber, E, may be made of any required size, so as to become a proper measure of quantity for steam to be let into the cylinder of the engine attached thereto, so as to work the steam in it with any degree of expansibility desired. If it be desired to stop the machinery attached to the wheel, G, this may be done by a clutch-box, situated in any convenient manner. Besides the great additional amount of power which may be derived from all boilers and engines in thus taking advantage of the current of steam in its passage to the engines, by this arrangement, another considerable object is attained, viz., by placing the safety, H, fig. 1, (or valves) in connection with the chamber, E, instead of immediately in the boiler, A, and connecting the pump of the engine for supplying the boiler with water to the shaft, *h*, whenever the engine is necessarily stopped, and steam maybe blowing off at the safety-valve,

it is at the same time being made use of, by its still acting upon the vessel, G, and, therefore, pumping into the boiler. This in locomotive engines will be found of great advantage when a carriage or engine may be necessarily delayed, as there is no adequate means of supplying the boiler except when in motion.

From what has now been described, I think it will be readily seen that this simple arrangement may also be advantageously applied to many other useful purposes, either as a separate engine and unconnected with any other, by allowing the steam to pass off freely from the cylinder, E, after imparting its power to the wheel, G, or in distillation, or whenever steam or elastic vapours are necessarily to be raised, no inconsiderable power may be gained by placing this engine in connection or between the still-head and the condensing worm, or other means of condensation. Also, when steam is raised or water heated for the purpose of warming buildings, a power may be evidently gained by taking advantage of its current. There are several other modes of taking advantage of this current, such as placing a spiral screw-fan or vanes of metal upon axes in the cylinder. E, (or other formed cylinders,) or as the one represented at fig. 3, where A, B, is the steam-pipe from the boiler to the engine; C, the arbor or axis of a float or detent-wheel, enclosed in the case, D, forming a part of the square steam-pipe, with a lid or cover on one side. The arbor, C, has a stuffing-box at one end, and the other end has no need of any thing being within the box. The front end which passes through the stuffing-box carries a pinion, as in fig. 1, but the arbor being horizontal in this case, a spur-wheel pinion is used, communicating with another large spur-wheel upon a shaft conveniently placed for carrying the power to be applied to any useful purpose: but I may say I have found none to succeed so well in practice as the one described under fig. 1, or as it is again repre-

sented in connection with the boiler before mentioned and described in fig. 4.

Fig. 4, A, B, represents a long bent tubular boiler, extending from the man-hole, 1 to 2, where it terminates above the brick-work in the steam-chamber, C, inclosing the apparatus or engine, D, similar to the one represented in fig. 1 (adapted there to a common boiler). This form of boiler, by its extended length and diminished diameter allows of greater strength, with equal capacity, when required, than those generally in use: it is inclosed in brick-work, when intended for a fixed engine, and surrounded from end to end by a flue which passes into the chimney; E^3, being the water line in the boiler, the fire never reaching above the water-line. 4, is the fire-door. 5, the fire-bars. 6, the ash-hole; and 7, the fire, which I prefer to be very long and narrow, so that the fresh coals be always fed at the mouth of the furnace, and the fire being occasionally pushed back upon the grates to receive them, the smoke from these having to pass over those already in ignition is better consumed than in any other way with which I am acquainted. The boiler is suspended in the middle of the flue by bands of iron between the ends of the boiler-plates, as shewn in the drawing, as those are secured by plates and fastenings upon the stone-work above. Above the fire-door, 4, is another door, to prevent the cold or external air from acting upon the end of the boiler or man-hole, 1. When this is opened the man-hole is easily reached, and is very conveniently situated for clearing the boiler. 8, is the waste steam-pipe, as it enters the chimney, *f*, the pinion for conveying the power to the large bevelled-wheel, *g*, as represented before in fig. 1. In fig. 4, *n*, is a cock and waste-pipe for letting off the steam from the boiler into the chimney, or in any other direction, when the engine is not required to work.

I claim, in the first place, the making use of and obtaining power from the currents of steam or other elastic

vapours in their passage from the boilers or vessels in which they are generated or produced to the cylinders of steam-engines. And I also claim the several arrangements or combinations of machinery hereinbefore described for effecting that purpose. And I claim as well these severally described arrangements or combinations as separate and distinct means or engines for producing or obtaining power when applied to all boilers or generators, as well as when in connection with the hereinbefore described boiler or generator, or when used in the process of distillation for warming buildings or other purposes, nad therewith producing power.—In witness whereof, &c.

Enrolled October 14, 1840.

Specification of the Patent granted to JOHN RAND, *of Howland Street, in the County of Middlesex, Gentleman, for Improvements in Preserving Paints and other Fluids.*—Sealed March 6, 1841.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said John Rand, do hereby declare the nature of my said invention to consist, first, in inclosing the said paints and other fluids in thin drawn tubes or cases of the metal tin, or of such other metal as shall be of such tenacity and pliability and little elasticity that the said tubes or cases made thereof may be closed at both ends, air-tight, by merely folding over the said metal, and nipping the seam so made, as hereinafter described: and also that their contents may be easily squeezed out by collapsing the said tubes or cases with external pressure, thereby causing the sides of the tubes to come and remain together behind their contents in such a manner as to exclude the atmospheric air from the end from which the

contents are expressed; by which means portions of their contents may be withdrawn from time to time, as occasion may require, at the same time preserving the remainder from the injurious effects of the atmosphere.

Secondly, in the application, in certain cases, of an end nozzle or spout and an air-tight cap, to the above described tubes or cases, for the purpose of emitting portions of their contents conveniently, and preserving the remainder by screwing on the said cap, which is provided with a cork for that purpose, as hereinafter explained.

Thirdly, in the manner hereinbefore alluded to of closing the said tubes or cases at the ends, so as to render them air-tight without the use of solder or cement, by bringing their opposite sides together parallel, then folding them over once or more times, as occasion may require, after the manner of what is usually called a hem in needlework, and pressing or nipping them with an instrument, as illustrated by the annexed drawing.

Fourthly, in filling the said tubes through a spout or funnel, of such form and dimensions as to nearly fill the capacity of the pressure-tube or case, thereby beginning to fill it at the bottom, or the part the farthest from where the filling-tube is inserted, and thus securing that the air be entirely excluded, the material being pressed through the filling-spout or funnel and deposited in the preserving-tube or case, while the spout or funnel is gradually drawn out, thereby leaving the preserving-tube or case full, when it is withdrawn, and so preserving the inclosed material from the injurious effects of bubbles of air, which might otherwise be inclosed with it.

Fifthly, in the application (for preserving paints and other fluids) of the metal tin generally for vessels, tubes, or cases of any shape, the seams of which are closed in manner aforesaid or not, and out of which the paint or fluid inclosed may be expressed as required, by causing the said preserving vessel, tube, or case, to collapse and remain collapsed at any point, in order to preserve, by

excluding the air from what remains therein, until the whole is taken out, such metal tin being far preferable to any other for this purpose, on account of its great ductility and little elasticity, its tenacity, its small comparative specific gravity, its cleanliness, its durability, its cheapness, and its power of resisting the action of painting materials generally, better than any other metal and equally cheap. And in further compliance with the said proviso, I, the said John Rand, do hereby describe the manner in which my said invention is to be performed by the following statement thereof, reference being had to the drawing annexed, and to the figures and letters marked thereon (that is to say) :—

Description of the Drawings.

Fig. 1, is a perspective view of one of my said drawn tubes or cases, supposed to be made of the metal tin, commonly called block-tin.

Fig. 2, is a perspective view of the same tube, after one end has been folded over like a hem, and nipped with a pair of nippers made for the purpose, and shewn at fig. 3, until the seam or joint so made is air-tight.

Fig, 4, is a perspective view of the same tube, after it has been filled with (say for example) white lead ground in oil, and the other end folded over and nipped as before, in which state it is fit for exportation, or to be preserved or kept for any length of time in the artist's colour-box.

Fig. 5, is a perspective view of one of my said drawn tin tubes or cases fitted with one of my said nozzles or spouts and cap.

Fig. 6, is a longitudinal section of the same, A, being a screw on to which the cap, B, screws, and C, a piece of cork, to keep the air from entering.

Fig. 7, is a perspective view of one of my said drawn tubes half empty, shewing the sides behind the paint, which has been squeezed out, in a collapsed state, thereby

preventing the ingress of air when the squeezing ceases, and before the cap can be screwed on again.

Fig. 8, is a sectional view of one of my said drawn tubes or cases, and the spout or funnel, which I call the filler, in the act of filling the said tube or case. In practice the force with which the paint enters the tube drives the tube off the end of the filler, so that when the tube is filled the position of the tube and filler are as shewn at fig. 9, and it will be seen that the tube must not be quite filled, but an allowance must be made for the hem or seam, which is to be folded over after it comes off the filler.

Now whereas I claim as my invention, first, preserving paints and other fluids by inclosing them in drawn tubes or cases of tin or other metal having the properties aforesaid, and capable of being collapsed in manner and for the purposes aforesaid.

Second, closing the said tubes or cases without the aid of cement or solder, by folding and nipping, as hereinbefore described.

Third, adding, in certain cases, a nozzle or spout and screw, or other air-tight cap, to the said tubes or cases, or to any vessels, tubes, or cases, for the purposes aforesaid, and having the collapsing and other properties aforesaid.

Fourth, filling such tubes or cases, or any vessels, tubes, or cases, in manner hereinbefore described, by means of spouts or funnels, which I call fillers, reaching to the bottom of the said vessel, tube, or case, for the purpose of excluding the air during the process of filling, as aforesaid.

And fifth, and lastly, the application of the metal tin, commonly called block-tin, generally for the manufacture of collapsable drawn tubes or cases, or of collapsable vessels of any form or any how made, for the purpose of preserving in them paints and other fluids in manner aforesaid. And such my invention being, to the best of my knowledge and belief entirely new and never before

used within that part of Her said Majesty's United Kingdom of Great Britain and Ireland called England, her dominion of Wales, and town of Berwick-upon-Tweed; I do hereby declare this to be my specification of the same; and that I do verily believe this my said specification doth comply in all respects fully and without reserve or disguise with the proviso in the said hereinbefore in part recited letters patent contained, wherefore I hereby claim to maintain exclusive right and privilege to my said invention.—In witness whereof, &c.

Enrolled September 6, 1841.

Specification of the Patent granted to JOSEPH PARKES, *of Birmingham, in the County of Warwick, Button Manufacturer, for Improvements in the Manufacture of Covered Buttons.*—Sealed March 29, 1841.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—*Now know ye*, that in compliance with the said proviso, I, the said Joseph Parkes, do hereby declare that the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention relates to improvements in the manufacture of covered buttons made by dies and pressure by the application of horn as a covering material; and in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the drawing hereunto annexed; first remarking, that the process resorted to by me for performing my invention, is very similar to that pursued in manufacturing Florentine buttons with such modifications as are rendered necessary

for adapting such process to the peculiar nature of horn, which, according to my invention, is the covering material employed for the front or face of each button.

Description of the Drawing.

Fig. 1, shews the section of a lower die, and also the upper die or punch, partly in section, which I employ for shaping the core of button-board, and applying a metal surface on one side thereof.

Fig. 2, is a section of another lower die in section, and also a punch or upper die partly in section, by means of which the button-board is further shaped, and a metal plate or surface is applied on the other side of the button-board, and the button-board, with the plates on either side, are properly shaped to the form desired, as will be hereafter described.

a, Fig. 3, shews a plan of a disc of iron plate with four projecting points, which I form by suitable dies in a fly-press, as is well understood, and then I turn the points down, and sink the disc, *a*, into the shape shewn in fig. 4, and I apply two such sunk discs to the internal core of the button-board of each button.

b, Fig. 5, shews a plan and edge view of a circular disc of button-board suitable for forming the internal core of a button. The dies, figs. 1 and 2, being placed in suitable presses, as is well understood in using similar dies in manufacturing Florentine or other covered buttons, one of the sunk discs, *a*, is placed in the under die, A, with the points upwards, having a disc of button-board placed on the points, as is shewn at fig. 6; the die or punch, B, is then caused to descend and press the button-board, *b*, into the shape shewn at fig. 7. The button-board, *b*, so formed by the dies, A, B, is to have a disc, *a*, applied on the other side, as shewn at fig. 8; the disc, *a*, to be next fixed to the button-board, is next put into the die, C, fig. 2, the disc, *a*, which has already been fixed, being upwards, the die, D, is now to be pressed down, which will

produce the button board with the discs, *a*, *a*, on either side into the shape shewn at fig. 9; and it will be seen, that one of the discs will, by the shape of the die, D, be sunk concave, whilst the other disc, *a*, on the other side, will be formed convex, or according to the figure of the face of the intended button. The core of button-board, fig. 9, is now ready for being inserted into the fabric, which is to become the flexible shank of the button, and which flexible shank is formed by sinking a portion of fabric in suitable dies, as is well understood when making similar shanks for Florentine or other covered buttons; and the shank being so sunk, the button-board or core, fig. 9, is to be placed thereon, with the concave surface towards the protruding shank, and the edges of the fabric are then to be pressed over the core, as is well understood, which will produce the partly formed button, fig. 10, which is an edge view, and consists of the shank containing the core, which is next inserted into the metal shell, *c*, fig. 11; and these parts being placed in the die, E, fig. 11*, and the die, F, being caused to press the parts together, the partly manufactured button, fig. 12, which shews a plan and edge-view, will be produced, consisting of the shank containing the core, covered on the front surface with the metal shell, *c*, which, by the die, F, has its edges bent down on the fabric of the flexible shank. The button thus far formed is now in a condition to be covered with a thin plate of horn, which is performed in the following manner:—

d, Fig. 13, shews a disc of horn cut out by suitable dies, the circumference being scolloped, in order that in folding over the form or shape or mould, fig. 12, the horn may not be puckered.

e, Fig. 14, shews a collet, such as I use for affixing the covering of horn to the button, the collet being similar to that used, in what is called Sanders's plan of making Florentine and other covered buttons. I would remark, that I employ the horn in the state of what is called

"lantern leaf," which is well known; but I prefer the leaves or sheets of horn to be thinner than when employed for lanterns, and I dye such sheets or leaves of horn by the well-known process of dyeing horn before covering buttons therewith.

Having now described the preparatory processes, which I consider best for forming the shape or mould of the button to be covered with horn, I will now proceed to explain how the covering process is to be performed.

Fig. 15, represents the section of a lower covering die, and also a proper punch (partly in section) for pressing the parts into the lower die, these dies being in a suitable press, as is well understood; the lower die is to be kept heated to such an extent, that the workman can just bear his hand to rest for a very short time on the upper surface of the die, and I prefer to accomplish such heating of the die by means of a flame of gas below the die; and it will be seen that there are holes, *f*, *f*, through the die, through which the heat of the flame may pass; and *g*, is an opening to allow of atmospheric air flowing under the lower die. The disc of horn, *d*, is placed in the lower die, G, the shape or mould, fig. 12, is then placed on the horn, and the punch or die, H, is caused to descend and to press the parts into the die, G; the punch or die, H, is then raised out of the die, G, in order to allow of the introduction of the parts shewn at fig. 16, and 16*, which consist of the tube, I, and the punch or die, J. The lower edges of the tube, I, is made bell-mouthed, so as to cause the scolloped edges to be pressed on to the back of the button, and the die or punch, J, is to cause the collet to be forced through the horn into the button; and in using these parts, the collet is placed into the tube, I, and the tube, I, with its punch inserted into the die, G, as is shewn at fig. 17, which figure represents the die, G, and the punch or die, H, in the condition just above described, after having forced the parts into the die, G; and this figure also shews the tube, I, with a collet, *e*, and the

punch or die, J, placed in the tube, I; and all things are in a condition to receive the pressure of the punch, H; but in order to prevent the pressure coming on the punch or die, J, before the horn has been folded down by the tube, I, the hollow block, K, is placed over the die or punch, J; consequently, when the die or punch, H, is caused to descend, it will force down the tube, I, and cause it to gather the edges of the horn, and press them on to the back of the shape or mould of the button, when the die or punch, H, will be again raised, and the block, K, removed, which will leave all things in the state shewn by fig. 18; and the again bringing down of the die, H, will cause the die or punch, J, to descend, and force the collet into the button, the punch or die, J, being retained in the tube, I, by means of the pin, Z, passing through a slit formed in the punch or die, J, as is shewn in the drawing, which allows of the punch or die, J, rising and falling in the tube, I, but prevents it coming out of that tube.

The button thus far formed is now in a condition to be completed in the finishing dies, fig. 19, the lower die being kept heated in a similar manner to the die, G; and there are holes, *f*, *f*, for the passage of the heated air from below, and also a passage, *g*, for the entrance of atmospheric air below the die. The dies being fixed in a suitable press, the button to be finished is inserted into the die, L, with the shank upwards, and the punch or die, M, is caused to descend and press the button into shape. I would remark, that the surface of the die, L, may be plain or ornamented by engraving or otherwise, according to the effect desired to be produced on the front or horn-covering of the button; but such engraving or otherwise ornamenting the dies for buttons, forming no part of my invention, and being well understood, it will not be necessary to describe the same in this my specification. It will, however, be proper to remark, that when the front of the button is to be plain, the disc of horn is to be polished before being used for covering; but

when to be used to cover a button, and finished by an engraved or ornamented die, the polishing is not necessary; and when using engraved or ornamented dies for producing an ornamented surface to the horn, the button will be required to remain longer in the die to obtain a good impression, as is the case in making horn buttons.

In the above description, I have confined myself to the making of convex buttons; but it will be evident, that the front of covered buttons, according to my invention, may be made flat by forming the dies, which shape the front surface of the button of a flat, in place of a concave, figure. If it be desired to have metal shanks to buttons covered with horn, the same may be done by having shanks and collets similar to those formerly employed in making Florentine buttons under Sanders's patent; but I prefer to use flexible shanks. And it will be found, that owing to the use of the disc, *a*, in forming the shape or mould of the button, the button-board employed will not be caused to protrude into the flexible shank by the pressure to which the parts are subjected in the process of making a button.

Having thus described the nature of my invention, I would remark, that I do not claim the means of making the mould or shape, shewn at fig. 12, nor the dies employed, when separately considered, very similar dies and means having been before used in the manufacture of other covered buttons; nor do I confine myself thereto, so long as the peculiar character and essence of my invention be retained, that of manufacturing covered buttons, made by dies and pressure, by the application of horn as the covering material. And I am aware, that what are called horn buttons have been made by forming the button wholly of horn, and when in a heated state, pressing a metal shank into the back thereof; and some attempts have been made for making horn buttons with flexible shanks, by using what are called "button blanks" of horn, and by forming a groove at the back, by turning

or otherwise, in the substance of the horn; and it was proposed to insert a cup of metal, having a flexible shank protruding through it, and a portion of pasteboard and a piece of metal placed in such cup, and the edges of such cup being inserted into the groove so formed in the substance of horn, the edges of the horn were pressed, in order to shape the horn-button, and to fill up the groove before mentioned, and to enclose the edges of the cup of metal with a view to hold the parts together; and such mode of forming horn buttons was included in the specification of a patent granted to Thomas Wells Ingram, horn-button manufacturer, of Birmingham, in 1837. In such case, the holding of the shank, depending on the strength of horn holding the cup of metal at the circumference, such process of making horn buttons has not been successful. I mention these matters in order to say, that I do not claim the making of buttons where horn is used, whether with metal or flexible shanks, where the body or substance of the button is of horn, or of the materials used as a substitute for horn; my invention relating, as above described, to the applying thin sheet horn as a covering material of buttons. It only remains to be remarked, that the button being made according to my invention, is to be finished by placing it in a lathe to be "edged," as is practised in finishing horn buttons. And I would have it understood, that what I claim is the mode herein described of manufacturing covered buttons by the application of horn, as a covering material, as above described.—In witness whereof, &c.

Enrolled September 29, 1841.

Specification of the Patent granted to THOMAS VAUX, *of Frederick Street, Gray's Inn Road, in the County of Middlesex, Land Surveyor, for Improvements in Horse Shoes.*—Sealed January 19, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Thomas Vaux, do hereby declare the nature of my said invention and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention relates to a mode of constructing horse-shoes with moveable caukings or projections, in order that the shoes may be roughed and unroughed with more facility, when required, and without taking off the shoes; and in order that my invention may be most fully described and readily carried into effect, I will proceed to describe the drawings hereunto annexed in the various figures, of which the same letters are used to indicate the same parts.

Fig. 1, represents a plan of a shoe constructed according to my invention.

Fig. 2, is a side-edge view; and,

Fig. 3, is a back-edge view thereof.

Fig. 4, shews a plan of the shoe separately; and,

Fig. 5, shews the various views of the cauks or projections used in roughing the shoe. *a*, *a*, represents the shoe. *b*, is a dovetail groove in front, which receives the cauk or projection, *b*[1], the nature of which is clearly shewn in the drawing; and, when in the dove-tail groove, the projection is securely retained by a screw, *c*. At the hinder parts of the shoe there are dovetail grooves, *d*, *d*, which receive the projections, *e*, *e*, and the same are se-

curely held by means of pins or screws, *f*, *f*, which are driven into holes formed at the back of the shoe, and bent over at the points, f^1, as shewn.

Fig. 6, shews a plan of another horse-shoe.

Fig. 7, is an edge view in section; and,

Fig. 8, is a back view thereof;

Fig. 9, being a plan of the shoe separately; and,

Fig. 10, shews various views of the parts employed for roughing the shoe. In this arrangement the mode of constructing and affixing the projection in front of the shoe is somewhat varied; for it will be seen that in place of fixing the same by a screw, as in the former case, there is a wedge, *g*, driven in at the back into suitable grooves formed in the shoe, as shewn; and a pin, *h*, is driven through the wedge and through the dovetail plate on which the projection is formed, and is clenched in front, as is clearly shewn in the drawing.

Fig. 11, shews a plan of another shoe having two projections in front, fixed by screws, in a similar manner to that shewn in fig. 1.

Fig. 12, shews a plan of the shoe without the projections. It will be evident that the projections so applied, owing to the dovetail form of the grooves in the shoes, and the manner of fixing the projections therein, will be most secure when in use; and in order to give strength to the shoe at the parts where the grooves are formed, I recommend that those parts should be somewhat thicker, as is shewn. In making shoes according to my invention, I make them by casting in malleable cast-iron, taking care to cast them with great accuracy, so that the grooves may not require the use of a file or other instrument; and I also make the parts with the projections of malleable cast-iron, by casting the same. And it will be found that in making the sand-moulds for casting the various parts, that if well and accurately formed models of the parts made of brass, be used, the castings produced will fit, requiring very little, if any

use of a file or other tool; and the various parts being thus cast, they are to be annealed for seven or ten days, according to the substance of the metal to be operated upon, as is well understood in working malleable cast-iron. The holes for the screws, and for the pins, *h*, are to be drilled or produced in casting, and those for screws are to be tapped, to suit the screws to be received.

I would remark, that although I prefer to use malleable cast-iron, I do not confine myself thereto, as shoes may be made by forging wrought-iron into the forms shewn.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that what I claim is, First, the mode of constructing shoes of malleable cast-iron with dovetail grooves and moveable projections as described.

Secondly, I claim the mode of making shoes of wrought-iron with dovetail grooves and moveable projections, as above described.—In witness whereof, &c.

Enrolled July 19, 1841.

Specification of the Patent granted to PIERRE DEFAUR DE MONTMIRAIL, *formerly of London Wall, in the City of London, but now of Panton Square, Haymarket, Gentleman, for certain Improvements in the Manufacture of Bread.*—Sealed June 2, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Pierre Dofaur de Montmirail, do hereby declare the nature of the said invention to consist, first, in an improved liquid for moistening the flour in order to make the dough.

Secondly, in an improved mode of adding salt to the flour; and,

Thirdly, in an improved apparatus for making the dough. And, in further compliance with the said proviso, I, the said Pierre Defaur de Montmirail, do hereby describe the manner in which the said invention, is to be performed, by the following statement thereof, reference being had to the drawing annexed, and to the figures and letters marked thereon (that is to say) :—

First, the liquid with which I moisten my flour, instead of doing so, as usual, with pure water, is made as follows:—To eight quarts of boiling water, I add four ounces of gum-arabic; when the gum is completely dissolved, I run it off into a vessel to cool to about blood heat, when it is fit to use, instead of pure water, and in the same manner, in order to make the dough. Secondly, instead of adding whatever salt is to be put into the bread, as is usual, by mixing it with the water to be used to wet the dough, I dry the quantity highly, before the fire or in an oven, taking care not to burn it, and then pulverize it as fine as possible, and in that state mix it thoroughly with the dry flour which is to be made into dough, and before it is wetted at all; this adds to the absorbent property of the flour, and causes the new liquid to mix more intimately with it.

Having now described my first and second improvements, I will proceed to describe; Thirdly, the apparatus which I employ in carrying the same into effect, referring to the drawing annexed.

Description of the Drawing.

A, is the close boiler for heating and preparing the moistened liquid. B, is the cooler, into which it is to be run when sufficiently heated, and the gum entirely dissolved; and C, is the kneading-trough. Now, whereas bread made with this fluid in the ordinary manner, and baked carefully, will yield a greater quantity from the same quantity of flour than when made in the old plan, and will be lighter, more wholesome, and more nutritious;

And I claim as the said invention the following improvements, that is to say. First, the use of liquid or mixture, hereinbefore described, instead of water only, to wet up the dough.

Secondly, the mixing of the salt, in a very dry and minutely pulverized state, with the dry flour, and not with the dough, or the water usually used to wet up or make the dough, as heretofore; and,

Thirdly, the apparatus hereinbefore described. And such my invention being to the best of my knowledge and belief entirely new, and never before used within that part of Her said Majesty's United Kingdom of Great Britain and Ireland, called England, Her said dominion of Wales, or town of Berwick-upon-Tweed; I hereby declare this to be my specification of the same, and that I do verily believe this my said specification doth comply in all respects, fully and without reserve or disguise, with the proviso in the said hereinbefore in part recited letters patent contained; wherefore I hereby claim to maintain exclusive right and privilege to my said invention.—In witness whereof, &c.

Enrolled December 2, 1840.

Specification of the Patent granted to FRANCIS POPE, *of Wolverhampton, Engineer, for Improvements in Detaching Locomotive and other Carriages.* — Sealed November 24, 1840.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Francis Pope, do hereby declare the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and

by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention relates to a peculiar construction of apparatus for detaching a horse from a carriage, or one railway-carriage from another. And in order that the invention may be readily undersood, I will first explain the apparatus as applied to a carriage drawn by horses.

Description of the Drawing.

Fig. 1, represents a carriage, having my invention applied thereto.

Fig. 2, is a plan of the apparatus separately, on a larger scale.

Fig. 3, is a side view; and,

Figs. 4 and 5, shew side sections of the apparatus when attached and unattached. *a*, *a*, are the shafts, each of which has two plates, *b*, *b*, affixed thereto, as is shewn, such plates carrying a pin, *c*, which forms the axes of the shafts, and also the means of the shafts being held by the attaching apparatus. The attaching apparatus consists of two side plates, *d*, *d*, which are conveniently affixed to the carriage, as is shewn, there being an apparatus for each shaft. *e*, is a bent lever or tongue, moving on an axis, *f*, carried by the plates, *d*, and it is this tongue or lever, *e*, which, embracing the pin, *c*, of the shaft, holds that pin securely in the recesses, d^1, formed in the ends of the plates, *d*; and so long as the tongue or lever, *e*, is held by the catch, hereafter described, the shaft will be securely attached to the carriage, but so soon as the catch is removed, the shaft will be drawn away from the carriage. *g*, is the catch, the nature of which is clearly shewn in the drawing; it moves on an axis at *h*, as is shewn; *i*, being a link attached by a pin-joint to the catch, such link being constantly pressed on by the spring, *j*, with a tendency to draw it downwards; hence whn the lever or tongue, *e*, is in the position shewn in figs. 1, 2,

3, and 4, the shafts will be securely held attached to the apparatus; but when the catch is drawn back, as is shewn at fig. 5, the tongue or lever will be released from the catch, and the shaft freed therefrom. I will now describe the mode of drawing back the catches, *g*, of the two shafts. *k*, is a tube affixed in the carriage. *l*, is a rod passing through the tube, *k*; and on the rod, *l*, there is a spring, *m*, which tends to hold up the rod, *l*. These parts and their mode of working will be better understood by examining fig. 6, where the several parts are on a larger scale. *n*, is a spring, which presses, against the rod, *l*, and keeps it in its place so long as the shafts are to be retained attached to the carriage; but when it is desired to let the horse go free, in order to separate the carriage, in the event of a horse running away, the rod, *l*, is drawn back, so as to release the catch, l^1, when rod *l*, is to be forced downwards, and which will force the bent bar, *o*, downwards also, as is shewn in fig. 1, and thus draw back the catches of the two shafts. The spring, *m*, is to bring back the rod, *l*, to its original position, on removing the pressure, the bent bar, *o*, which connects the catches, passes through the forked end of the rod, *l*, there being friction rollers, l^2, in order to the bent bar moving freely when the carriage is on the back.

Figs. 7, and 8, shew a side view and plan of so much of two railway-carriages, attached by similar apparatus to that above described, as will enable me to explain the use thereof to railway purposes. In connecting two railway-carriages, three of the apparatusses are used, two of which have chains, *p*, applied, and the middle one is connected by an apparatus similar to that applied to a shaft, as before described; and the bar, *o*, which connects the three catches is moved by means of the rod, *l*, by a guard or other person riding with one of the carriages, such bar being connected by a pin-joint, as shewn; and there is to be suitable means for securely supporting the rod, *l*, when the connection of the two carriages is to be

maintained. The parts of figs. 7 and 8, being marked with the same letters of reference, the description above given will apply, and need not be repeated here.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood, that what I claim is the mode of constructing and applying apparatus, as above described.—In witness whereof, &c.

Enrolled May 24, 1841.

Specification of a Patent granted to Edward Finch, *of Liverpool, Iron Master, for Improvements in Propelling Vessels.*—Sealed March 25, 1841.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Edward Finch, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention has for its object a mode of ayplying inclined surfaces on the main shafts of steam vessels, by means of which the vessels will be propelled by a succession of efforts, in place of the continuous action of paddle wheels and screws. And in order that my invention may be most fully understood and readily carried into effect, I will proceed to describe the drawing hereunto annexed, in various figures of which the same letters of reference are used to indicate the same parts.

Description of the Drawing.

Fig. 1. represents one of the propellers suitable for my invention, and consists of two sectors of a circular plane, as is indicated by the red line; and such two sectors forming a portion of the plane, are set at an angle across the main shaft of a steam vessel; and I usually place them at an angle of about 50°, and in such manner that the propellers will be horizontal, or nearly so, when the crank is vertical, by this means the propellers will be out of the water when the engine is in its least powerful position; and as the piston of the engine moves towards the middle of its stroke, one of the propellers will come more and more into effective action, and will be at its best position at the time that the piston of the engine comes to the middle of its stroke, and as the piston again comes to rest the propellers will come out of action; and in case there be two engines employed, then in place of causing the cranks to be set at right angles, or nearly so, as as now practised, I cause one of the cranks, only very slightly, to have the lead of the other, and the propellers will act sufficiently as a fly-wheel, to carry the engines over their centres.

Fig. 2, is an edge view of the propellers.

Fig. 3, shews the propellers on an axis, indicating the position of the crank, *b*.

Fig. 4, shews a side view of a steam-vessel, having propellers applied according to my invention.

Fig. 5, shews a transverse section of the vessel. I would remark, that although I prefer to have only one propeller, consisting of two sectors of the same plane at each side of the vessel, yet more may be employed, as is shewn at figs. 6 and 7, and although I prefer that the two sectors of which each propeller is composed should both be on the same plane, yet that is not absolutely necessary, as they may be of two planes set or affixed on

the axis or shaft in opposite directions, as is shewn in fig. 8; and more than one of such propellers (each composed of two sectors) may be employed at each side of the vessel, as is shewn at fig. 9. It will readily be understood, that in the revolution of the main-shaft or axis of the steam-engine or engines, the propellers will successively act in the water, and by successive efforts propel the vessel, which will be found to be more advantageous than when the power of the engine or engines is continuously acting, as is the case in propelling with paddle-wheels or with screws. And there is another advantage in the use of propellers according to my invention, that when it is desired that the vessel should sail without using the propellers, then, by causing the engine or engines to be stopped at the end of the stroke, the crank or cranks will be vertical and the propellers horizontal, and, consequently, out of action, and at the same time above the water; they will, therefore, in no way interfere with the progress of the vessel.

Having thus described the nature of my invention, I would remark that I do not confine myself to the particular form of the propellers, *a, a*, as shewn, so long as they are portions of a plane, and set or fixed on the shaft at an angle, and in such manner as to be out of action, in respect to the water when the crank is vertical, or nearly so (whether up or down), and in full force when the piston in the steam-engine is about the middle of the stroke. And I wish it to be understood, that what I claim is the mode, above described, of applying propellers, portions of a plane, across the main axis or shaft of a steam-vessel, and in such manner that they are horizontal, or approaching thereto, when the crank or cranks are in a vertical position, and thus propelling the vessel by a succession of efforts.—In witness whereof, &c.

Enrolled September 25, 1841.

Specification of the Patent granted to Henry Seymour Moore Vandeleur, *of Kilrush, in the County of Clare, Ireland, Gentleman, for certain Improvements in Paving or Covering Roads and other Ways.*— Sealed December 16, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.— *Now know ye*, that in compliance with the said proviso, I, the said Henry Seymour Moore Vandeleur, shall cause a particular description of the nature of my said invention to consist; first, in the form or forms or shape, to which I cut or make the blocks of wood, stone, brick, slate, or other material or materials; and,

Secondly, the invention consists of a mode of supporting the various blocks, of which a pavement is composed.

And in further compliance with the said proviso, I, the said Henry Seymour Moore Vandeleur, do hereby describe the manner in which my said invention is to be performed, by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say):—

Description of the Drawing.

Fig. 1, represents a perspective view of the blocks for paving, constructed or shaped according to the first part of my invention; and it consists in forming or shaping two surfaces of each of the blocks to angular figures, the angles of the different blocks being produced by radial lines, from a point distant from the under surface of the road or other paved way, such angles not running from bottom to top of the blocks, but only running partly up the block, the upper parts of the same two side-surfaces, *a*, of each block being formed into angles caused by radiating lines from a point above; thus it will be seen on exam-

ining figure 1, that two of the side-surfaces, *a*, to *b*, are produced from a point, *c*, below the surface of the road or paved way, and the upper part of the surface, from *d*, downwards to *b*, the angular surfaces of the same blocks are produced by lines radiating from a point, *e*, above the surface of the road or other paved way.

Fig. 2, shews another arrangement of blocks, arranged according to this part of my invention, in order to explain that the length of the upper and lower inclined radiating surfaces of the blocks may be varied, without departing from my invention; and it will be seen that in this case the lower inclines from *a*, to *b*, are carried higher up the blocks; and I would state, that in place thereof, the upper inclined surfaces from *d*, to *b*, may be made longer than the lower inclined radiating surfaces, my invention consisting in the mode of combining radiating surfaces in the paving of roads or ways, as herein described. And I would state, that although I do not confine myself to any particular distance of the radiating points to which the blocks are cut, whether for the lower or upper portions of the blocks, at the same time I consider it will be best to observe the following rule, that is, having the radiating points, above or below, at a distance equal to about one-seventh of the width of the road way.

I will now describe the second part of my invention:—

Fig. 3, shews a single rectangular block of wood or other material suitable for paving. In each of the angles at the sides of each block a portion is removed, and a groove is formed, as is clearly shewn; hence when four blocks are placed together, there will be a space produced capable of receiving a small cube or block as a filling piece, as is shewn at fig. 3 and 4, at *f*, *f*; and by such means the angles of each block will be supported by the angles of eight surrounding or neighbouring blocks, and by this means one block cannot descend, unless others go down with it.

Having thus described the nature of my invention, I

would have it understood, that what I claim is, first, the mode of applying blocks with radiating surfaces in opposite directions, as above described; and, secondly, I claim the mode of applying blocks with grooves, or recesses formed in their side angles, and applying filling pieces, as described, in respect to figs. 3 and 4.—In witness whereof, &c.

Enrolled June 16, 1840.

Specification of the Patent granted to JOHN BETHELL, *of Mecklenburgh Square, in the County of Middlesex, Gentleman, for Improvements in Rendering Wood, Cork, Leather, Woven and Felted Fabrics, Ropes, and Cordage, Stone and Plasters, or Compositions, either more Durable, less Pervious to Water, or less Inflammable, as may be Required, for Various Useful Purposes.*—Sealed July 11, 1838.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said John Bethell, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following description thereof (that is to say):—

My invention in rendering wood, cork, leather, woven and felted fabrics, ropes and cordage, stone and plasters, or compositions, either more durable, less pervious to water, or less inflammable, as may be required, for various useful purposes, consists in more perfectly impregnating such articles, in manner herein after described, with various mixtures or solutions, hereinafter mentioned, so that they may be saturated throughout with such mixtures and solutions, whereby they are rendered either more durable, less pervious to water, or less inflammable, according to the different mixture or solution with which they are im-

pregnated. To explain my invention more clearly, and to shew how it is carried into effect, I will first describe the various forms of apparatus, or means for more thoroughly impregnating the articles with the mixtures and solutions; then, secondly, the mixtures or solutions; and, thirdly, state with what mixtures or solutions each description of article is to be impregnated, as aforesaid, to render it either more durable, less pervious to water, or less inflammable, as may be required for various useful purposes. First, as to the various apparatus or means for more thoroughly impregnating the above named articles with the mixtures or solutions hereinafter described. These forms of apparatus are constructed for the purpose of forcing the various mixtures or solutions, hereinafter named, into the interior of the above named articles, either by means of hydrostatic or pneumatic pressure, aided in some cases by exhausting the pores of the articles of the atmospheric air contained therein, or by boiling the articles in vacuo, or, as to wood, by placing the butt ends of trees, immediately after they are felled, in vessels containing the solutions of the first class, hereinafter described, so that the solutions may circulate with the sap throughout the interior of the tree, and thus thoroughly impregnate the wood. The various apparatus I will now describe:—An air-and-water-tight vessel or tank, must be made of strong metal of any form that may be preferred (one made like the circular wrought iron boilers for high-pressure steam-engines answers very well) strong enough to withstand an internal pressure of two hundred pounds to the square inch, having a lid or door to it, which is made to screw on air-tight. The tank is fitted on the top with a common steam-boiler safety-valve, and it is connected by one pipe having a stop-cock or valve in it with an exhausting air-pump, and by another pipe likewise fitted with a stop-cock with a pump for forcing liquids in the tank, made like the pumps for forcing water into the hydrostatic presses. This form of apparatus is well known, and can be made by any en-

gineer. The articles to be impregnated are put into the tank, and the lid screwed on air tight, the cocks in the pipes leading to the pumps being shut; the tank is then filled with the desired mixture or solution, through a pipe having a stop-cock in it, which is then shut, and the cock in the pipe leading to the air-pump being opened, that pump is set to work for the purpose of exhausting or drawing the air out of the tank, and also out of the pores of the various articles, after which the liquid, mixture, or solution, will penetrate into and fill up those pores before occupied by the air, more particularly if the tank is kept heated, which may be done in any convenient manner; but for some articles this may not be found sufficient, and in such cases the air-pump having been exhausted, the tank is stopped, the cock or valve shut, and the liquid force-pump set to work (its cock being previously opened), to force some of the same mixture or solution into the tank until the required degree of pressure is obtained. The working of the liquid forcing-pump must be repeated every one or two hours, as the articles, by absorbing the mixture or solution, causes the pressure to diminish. The degree of pressure to which it is determined to work up to, is regulated by loading the safety-valve with the appropriate weights, and as soon as the pressure of the condensed liquid exceeds the weight on the valve, the liquid is forced out of the valve, and the pressure within reduced. In impregnating wood by this apparatus, I have found that the process is much expedited, by placing the logs of wood in the tank in a perpendicular or slanting position, so that the butt ends of the logs may be at the bottom of the tank, and their upper ends a little above the surface of the liquid. In this case as soon as the exhausting process is commenced with the air-pump, the air travels freely up the longitudinal pores of the wood, and the liquid follows it, entering into such pores at the bottom or butt end of the log, and following the air as it is drawn out of them at the top by the air-pump. It may not be

necesssary, with some very porous articles, to use both the processes of exhausting the tank of air by the air-pump and forcing in the liquids by the hydrostatic force-pump; but either one or other of the processes, as is most convenient, may be used, and will be found to impregnate the articles sufficiently. The form of apparatus above described, is that which I prefer using, but it is evident that the pressing or forcing the liquid mixtures or solutions into the articles, by means of pneumatic or hydrostatic pressure, may be obtained in various other modes, some of which I will mention. Steam at very high pressure may be let into the tank through a pipe, over the surface of the liquid within, thereby pressing on it with considerable force; or condensed air might be pumped in for the same purpose, or an hydrostatic force may be obtained in the closed tank, by connecting it by means of a pipe having a stop-cock in it, with a cistern placed at a considerable height above the level of the tank; when, upon the cock being opened, the pressure of the liquid through the pipe from the elevated cistern, will be increased in the tank, in proportion to the altitude of the cistern over the tank.

Another mode of impregnating wood is, by means of bags made of sheet caoutchouc, or air-and-water-proof cloth, large enough to hold about two gallons, which are made open at one end, into which the butt ends of the pieces of wood are placed, and the edges of the bags tied very firm and close to the pieces of wood by means of small lines wound several times round the outside edges of the bags over the pieces of wood; and to the other ends of the bags are fitted small pipes furnished with stop-cocks, which proceed either to an elevated cistern containing the liquid with which it is desired to impregnate the wood, as above described, or else to a liquid forcing-pump, as above mentioned. When the cock in the pipe is opened, the liquid in the cistern, by its greater altitude, will force its way into the pores of the wood, or

when the pipe is connected with the pump, the hydrostatic pressure, caused by the pump when worked, will force the liquid into the pores of the wood; one cistern or pump will thus be sufficient to impregnate many pieces at once. Trees that have been just cut down may be rapidly impregnated in this manner, and many such new fallen trees will be thoroughly impregnated in a few dyas, with the solutions of the first class, hereinafter mentioned, by merely placing the butt ends in troughs or open tanks, filled with the solutions, which will circulate the sap throughout the whole tree. Skins of leather, and fabrics of any kind, may be impregnated in a similar manner, by sewing them together in the form of bags, having pipes leading to an elevated cistern or pump, as above described, through which the solutions or mixtures may be forced into the bags, and through every pore of the skins or fabric; pipes made of leather or of folds of thick canvas can, in this manner, be made less pervious to water with the mixtures or solutions hereafter mentioned for that purpose, by closing one end of the pipes, and forcing the liquid mixtures in at the other end. Any of the articles may also be impregnated by placing them in the tank above described, exhausting the air thereout by the pump, and then applying heat in any convenient manner to the tank, until the solution or mixture therein is made to boil, which is commonly called boiling in vacuo.

Secondly, as to the mixtures or solutions to be used with either of the above forms of apparatus, for impregnating the various articles: to describe these more clearly, I have divided them into three classes, the first class containing such as are applicable to render certain of the articles above named more durable. The second class, such as will render all the above named articles more durable, and less pervious to water; and, the third class, such as will render them less inflammable.

No. 1. Solution of sulphate of iron, one pound of the

salt to be dissolved in two or three gallons of water, and to be used as soon as dissolved, or the pyroligneous iron liquor used by dyers, mixed with about half its quantity of water.

2. Sulphate of copper, one pound of the salt dissolved in three or four gallons of water.

3. The waters of copper mines, and also the waters of streams or brooks in a copper country, which contain copper suspended in solution in them.

4. Chloride or chlorate of copper, one pound dissolved in four gallons of water.

5. The yellow chlorate of potash, one pound dissolved in four gallons of water.

6. Refuse lime water from gas works; this liquor must be allowed to rest for several days until the same is precipitated to the bottom, when the supernatant liquor may be drawn off, and used to impregnate wood. I would here remark, that I prefer that the solution of chromate of potash, and of the refuse lime liquor of the gas works should be forced into the pores of the wood in manner above mentioned, but I do not mean to confine myself to the mere impregnating the wood therewith in such manner, but I do claim the use of chromate of potash, and of the said refuse lime liquor in any manner that may be preferred, for the purpose of rendering wood more durable, as part of this my invention.

The Second Class.

No. 7. Any mineral tar or bitumen, or any vegetable tar, mixed, when necessary so to do, with any volatile oil or spirit, to thin it sufficiently to penetrate the articles of which it is to be used, and to which may be added a portion of caoutchouc or black resin, which is incorporated therewith by heat.

8. Coal-tar obtained from gas-works, thinned with from one-third to one half of its quantity with the essential oil or spirit obtained by the distillation of coal-tar. That which

I use is the common spirit left after the naptha is obtained, and commonly called in the trade "dead oil;" either caoutchouc or resin may be added to this mixture if required, by dissolving the caoutchouc or resin in the coal-tar and oil by heat, or by adding the well known caoutchouc paste or varnish to the tar and oil, heating the mixture, and stirring it well until the caoutchouc is thoroughly mixed with the tar. From a quarter to half a pound of caoutchouc or half a pound of black resin to one gallon of tar and oil may be used, but it will be necessary that more of the dead oil should be added to thin it sufficiently to penetrate into the wood, &c. The foreign bitumens or asphaltes may be used instead of the coal-tar, but they will require a greater proportion of dead oil, or other volatile oil to thin them sufficiently.

No. 9, vegetable tar, as Archangel or Stockolm. These tars contain an acid, which is injurious, and therefore before using them, I free them from it, by agitating them for some time with lime water, or by throwing into the tubs or vessels in which the tar stands, a quantity of old rusty iron, or iron slag; and this prepared tar is then mixed with the above named dead oil, or with the spirit distilled from itself; but I prefer the dead oil, as it is cheaper. Caoutchouc or resin may be added thereto, if desired, in manner described in No. 8.

No. 10, whale oil, cod fish oil, or any other fish oil, mixed with from one third to one half of dead oil.

11, the same as No. 10, with the addition of sulphur: as three ounces of sulphur dissolved by heat in every gallon of the mixture, No. 10.

12, boiled or drying linseed oil, mixed with oil or spirits of turpentine.

No. 13, boiled or drying linseed oil, to which caoutchouc paste is added: as about one half of a pound of caoutchouc paste to every gallon of linseed oil.

No. 14, rape oil, in which caoutchouc is mixed, as in No. 13.

No. 15, solutions of caoutchouc in spirits of naptha or turpentine, or any other spirits.

No. 16, bees' wax dissolved in spirits of turpentine: as about one pound of wax dissolved in one gallon of spirits of turpentine.

The Third Class.

No. 17, soluble glass dissolved in water, in the proportion of one pound to five or six gallons of boiling water. (Soluble glass is well known, and the mode of making it is fully described in several chemical and other books.)

No. 18, four pounds of alum, eight pounds of potash or soda, two pounds of borax, and four ounces of glue or starch dissolved in twenty gallons of boiling water. The articles to be dissolved in the water in the order in which they are named.

In describing the solutions and mixtures above named, I have given the proportions of the ingredients composing the distinct solutions and mixtures, and also the separate solutions and mixtures which I have found to answer best; but I do not mean to confine myself to these proportions, or to the use of these solutions or mixtures separately, because the ingredients composing each solution and mixture may be mixed in different proportions, and several of these solutions or mixtures may be combined with each other, in order to produce the desired effects.

Thirdly, as to the different mixtures or solutions with which the different articles are to be impregnated. Wood may be impregnated, in manner above mentioned, with either of the solutions, No. 1, 2, 3, 4, 5, or 6, of the first class, to render it more durable. When No. 1, is used, and it is intended to place the wood where it will be exposed to the weather, I recommend that the wood be painted or tarred over, which will not be necessary when placed in the interior of a house, or under cover. To render wood more durable and less pervious to water, I use any or either of the mixtures, No. 7, 8, 9, 10, 11, 12,

or 13, of the second class, according to the different purpose to which the wood is to be applied. The mixtures, No. 7, 8, 9, 10, or 11, are chiefly applicable to wood that is much exposed to the weather, as for rail-road sleepers, piles, out door posts and fences, &c. &c. For woods intended to be polished, I use No. 12, which peculiarly fits it to take a high polish; and for wood that it is desirable to render tough, such as carriage-wheels, frames of machines, &c. &c., I use 13. The mode of impregnating wood by means of bags, as above described, or new fallen trees by the circulation of the sap, is not applicable to impregnate with either of these last named solutions of the second class; but in such cases the wood must be impregnated in the tank, in the manner above mentioned. Cork may be rendered more durable and less pervious to water, by impregnating it in manner above mentioned with several solutions above named, but I prefer using either No. 12, 13, 14, or 15. Leather I impregnate in manner above mentioned, with either of the mixtures, No. 12, 13, 14, 15, or 16, of the second class respectively, to render it more durable and less pervious to water: in this manner boots and shoes may be rendered less pervious to water after they are made. To render woven and felted fabrics, including paper, more durable and less pervious to water, I impregnate them in manner above named, with either of the mixtures, No. 12, 13, 14, 15, or 16; and besides these, canvass may be impregnated with either of the solutions, No. 2, 3, or 4, to render it more durable. To render ropes and cordage more durable and less pervious to water, I impregnate them in manner above mentioned, with either of the mixtures, No. 12, 13, 14, or 15. All descriptions of porous stones, such as Portland stone, freestone chalk, some marbles, and plaster of Paris, or such compositions as are made with burnt clay, or with plaster of Paris, and cements in imitation of plaster or stone, are to be impregnated in the manner above named, with the solutions,

No. 1, 2, 3, of the first class to render them more durable, and with either of the mixtures of the second class, to render stone more durable and less pervious to water; for Portland stone, or freestone chalk or any other porous stone, No. 8, 9, 10, or 11, may be used. Statues or architectural ornaments made of Portland stone or freestone, when impregnated with these mixtures will become infinitely more durable, and if the colour is objected to, they can afterwards be painted in any color that is desired. Marble ornaments or statues, when impregnated with either of the mixtures, No. 11, 12, 13, 14, 15, or 16, will resist the injury generally caused by exposure to the weather, and become more durable and less pervious to water, which congealing in its pores by the frost, causes it frequently to crumble away. Statues or ornaments made of plaster of Paris, or with the compositions above mentioned, must be impregnated with either No. 1, 2, or 3, of the first class, or with either No. 10, 11. 12, 13, 14, 15, or 16, of the second class. Bricks impregnated with either No. 7, 8, or 9, would be very durable and less pervious to water, and useful for many purposes, particularly for building foundations of houses, or cellars in damp situations, or for paving the streets, the joints being made with asphalte or bituminous matter, instead of common lime-mortar. All the articles above named may be rendered less inflammable, by impregnating them in manner above described, with either of the solutions of the third class, No. 17 or 18.—In witness whereof, &c.

Enrolled January 11, 1839.

Specification of the Patent granted to ROBERT HERVEY, *of Manchester, in the County of Lancaster, Drysalter, for Improvements in the Mode of Preparing and Purifying Alum, Alumina, Aluminous Mordants, and other Aluminous Combinations and Solutions, and the Application of such Improvements to the Purposes of Manufacture.*—Sealed December 13, 1839.

To all to whom these presents shall come, &c. &c.—*Now know ye,* that in compliance with the said proviso, I, the said Robert Hervey, do hereby declare the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following explanation thereof (that is to say):—

My improvements in the mode of preparing and purifying alum, alumina, aluminous mordants, and other aluminous combinations and solutions, and the application of such improvements to the purposes of manufacture, consist in the following processes. In the first place I take clay, selecting such as contains the smallest quantity of iron, and which will yield the largest quantity of alumina. This clay is then dried, and afterwards ground, and passed through a fine sieve; in this state it is put into a reverberatory furnace, and then calcined to a moderate red heat; it is then drawn out of the furnace and allowed to cool. After this it is put into leaden cisterns, and oil of vitriol (sulphuric-acid), diluted to the strength of from 10° to 80° of Twaddell's hydrometer, is added to the extent of from one half to the entire weight of the clay, used according to the quality of the clay employed. The oil of vitriol and clay are then to be well stirred and mixed together, where a great ebullition or belief ensues; after this has subsided, the mixture is again to be well stirred, and water, cold or hot, is then gradually added to extract or separate the sulphate of

alumina thus formed. The mixture is then allowed to settle for about forty-eight hours, when the undissolved portion of the clay falls to the bottom, leaving sulphate of alumina above. The sulphate of alumina is then drawn off into another leaden cistern, and the clay again lixiviated with water to extract any remaining sulphate of alumina, which, after settling about twenty-four hours, is drawn off into another cistern, and employed, instead of water only, in lixiviating a fresh quantity of clay and oil of vitriol. The sulphate of alumina thus formed as described (according to a process long known and practised in this country), is always impregnated with a considerable portion of iron, to get rid of which I employ two methods: in the first place, I add to the sulphate of alumina a quantity of prussiate of soda, or prussiate of lime, or any other combination of the prussic or ferro-prussic-acid, sufficient to precipitate all the iron held in solution in the sulphate of alumina; the supernatant sulphate of alumina thus purified is then drawn off, and in this state is fit for the purposes of the arts. If, however, I wish to convert the sulphate of alumina into alum (so commonly called or known), I add thereto potash, or sulphate of potash, or other of its combinations, the potash in which shall be equal, or nearly so, to the quantity of alumina to be so converted into alum; or I add an equivalent quantity of ammonia, or sulphate of ammonia, or other of its combinations. Soda may also be used, but alum is difficult of formation therewith. The liquor thus containing the constituents of alumina, is then evaporated by boiling, till it attains the strength of about 70° of Twaddell's hydrometer. It is then run off into leaden or other cisterns to crystallize; after cooling, the mother liquor is drawn off, and the alum salt formed is removed from the sides or bottoms of the cisterns, and dissolved in as small a portion of boiling water as possible. The solution is then run into large casks, called "rocking" casks, which, after the lapse of

ten to fourteen days, are taken to pieces, and the alum thus formed is broken up, and is ready for the market. For the purposes of the arts, however, the presence of an alkali is generally injurious, and is only employed, because, without it, the alum of commerce cannot be formed; but the purposes of the printer, dyer, or mordant maker, the sulphate of alumina alone, when freed from iron, is very preferable to alum. To convert the sulphate of alumina into the aluminous mordant, known in commerce by the name of "red liquor," which is an acetate of alumina, I add either a quantity of acetate of lime or lead, in sufficient quantity for the lime or lead to unite with and carry down the sulphuric acid of the sulphate of alumina, thus leaving a supernatant acetate of alumina; or I take the sulphate of alumina, and by the addition of an alkali or its combinations, such as potash, soda, or ammonia, or an alkaline earth, or its combinations, such as lime or magnesia, saturate or take up all the sulphuric acid, when the alumina no longer held in solution precipitates. This alumina I then re-dissolve in acetic pyroligneous acid, which converts it into the acetate of alumina, or "red liquor" of commerce, or it can be sold in the state of pure alumina, and be dissolved by the printers, or dyers, or others, in acetic or sulphuric acid, according to the purpose for which they wish to employ it; or I take the sulphate of alumina, formed, as before described, from clay and sulphuric-acid, but not freed from iron, and add a sufficient quantity of acetate of lead or lime to unite with the sulphuric-acid in the sulphate of alumina, leaving a superabundant acetate of alumina, to which I add a sufficient quantity of the prussiate of potash, soda, or lime, or other combinations of the prussic or ferro-prussic, to unite with and carry down all the iron in the acetate of alumina. After allowing it to settle, the clear liquor must be drawn off, care being taken not to disturb the bottoms or sediment; or I precipitate the alumina from the impure sulphate of alumina,

and re-dissolve it in acetic or pyroligneous-acid, and afterwards precipitate the iron in the manner before described. Another method by which I free the sulphate of alumina so formed: I add, as before described, an alkali, or alkaline earth, combined or otherwise, for the purpose of precipitating the alumina. As, however, this way the iron is also precipitated along with the alumina, I re-dissolve the alumina in caustic-alkali, such as potash or soda, which will dissolve the alumina, and only a very small portion, if any, of the iron; I then draw off the clear liquor, taking care not to disturb the bottom or sediment, and to this liquor add sulphuric-acid, or acetic, or pyroligneous, or some other, and to neutralize the alkali which holds the alumina in solution, when the alumina precipitates, and may be sold, either in that state, or converted into sulphate of alumina for sale, or otherwise, or into acetate of alumina, or into the alum of commerce, by the addition of sulphuric-acid and potash or ammonia.

Having now described the particulars of my improvements, and the method of carrying the same into practical effect, I desire it to be particularly understood, that I claim, as my invention, the method I have described for preparing and purifying alumina, and other aluminous solutions and combinations, and also for manufacturing aluminous mordants from sulphate of alumina and alumina, instead of from the alum of commerce, in the manner and for the purposes herein set forth.—In witness whereof, &c.

Enrolled June 10, 1840.

PATENTS GRANTED FOR SCOTLAND,

From September 24, to November 3, 1841.

Thomas Gore, of Manchester, in the County of Lancaster, Machine Maker, for certain improvements in machinery or apparatus for roving, spinning, and doubling

cotton, silk, wool, and other fibrous materials.—Sealed September 24, 1841.

THOMAS WARREN, of Montague Terrace, Mile End Road, in the county of Middlesex, Gentleman, for an improved machine for making screws.—Sealed September 30, 1841.

GEORGE ENGLAND, of Westbury, in the county of Wilts, Clothier, for improvements in weaving woollens and other fabrics, and for twisting, spooling, and warping woollen and other fabrics, and also for improvements in the manufacture of woollen doe-skins.—Sealed September 30, 1841.

WILLIAM CHURCH, of Birmingham, in the county of Warwick, Gentleman, for certain improvements in hooks and eyes, and in machinery for manufacturing the same. —Sealed October 4, 1841.

JOSEPH MILLER, of Monastry Cottage, East India Road, in the county of Middlesex, Engineer, for an improved arrangement and combination of certain parts of steam-engines used for steam-navigation.—Sealed October 8, 1841.

JOHN VARLEY, of Bayswater Terrace, Bayswater, in the county of Middlesex, Artist, for an improvement in carriages.—Sealed October 11, 1841.

JOHN BARWISE, of Saint Martin's Lane, in the county of Middlesex, Chronometer Maker, and ALEXANDER BAIN, of Wigmore Street, in the said county of Middlesex, Mechanist, for improvements in the application of moving power to clocks and time-pieces.—Sealed October 15, 1841.

WILLIAM CRAIG, Engineer, ROBERT JARVIE, Rope Maker, and JAMES JARVIE, Rope Maker, all of Glasgow, in the Kingdom of Scotland, for certain improvements in machinery for preparing and spinning hemp, flax, wool, and other fibrous materials.—Sealed October 19, 1841.

WILLIAM EDWARD NEWTON, of the Office of Patents, 66, Chancery Lane, in the county of Middlesex, Civil Engineer, for certain improvements in the manufacture of

fuel. Communicated by a foreigner residing abroad.—Sealed October 19, 1841.

Floride Heindrückx, of Fenchurch Street, in the city of London, Engineer, for certain improvements in the construction and arrangement of fire-places and furnaces applicable to various useful purposes.—Sealed October 20, 1841.

Joseph Wright, of Carisbrook, Isle of Wight, Mechanic, for improvements in apparatus used for dragging or skidding wheels of wheeled-carriages.—Sealed October 27, 1841.

Robert Logand, of Blackheath, in the county of Kent, Esquire, for improvements in obtaining and preparing the fibres and other products of the cocoa-nut, and its husks.—Sealed October 27, 1841.

Joseph Clisild Daniell, of Tiverton Mills, near Bath, for improvements in the manufacture of manure, or composition to be used on land as manure.—Sealed October 27, 1841.

Alfred Jeffrey, late of Prospect Place, New Hampton, in the county of Middlesex, and now of Lloyd Street, Pentonville, in the same county, for a new mode of defending the sheathing of ships, and protecting their sides and bottoms.—Sealed October 27, 1841.

William Neilson, Builder, residing in Glasgow; and David Lyon, Builder, residing in Tradeston, of Glasgow, both in the county of Lanark; and Peter McOnie, Engineer, residing in Kinning Place, Glasgow, in the county of Renfrew, all in Scotland, for a mode or modes of, or an improvement in, cutting, dressing, preparing, and polishing stones, marble, and other substances, and also in forming flat or rounded mouldings, and other figures thereon.—Sealed October 29, 1841.

James Whitelaw, of Glasgow, in the county of Lanark; and James Stirrat, of Paisley, in the county Renfrew, Manufacturer, for improvements in rotary machines to be worked by water.—Sealed November 3, 1841.

LIST OF NEW PATENTS.

William Golden, of Huddersfield, Gun Maker, and John Hanson, of the same place, Lead Pipe Manufacturer, for certain improvements in fire-arms, and in the brillets and other projectiles to be used therewith.—Sealed November 2, 1841.—(*Six months.*)

Thomas Macauley, of Curtain Road, Upholsterer, for certain improvements in bed-steps, which are convertible into other useful forms or articles of furniture.—Sealed November 2, 1841.—(*Six months.*)

Robert Logan, of Blackheath, Esquire, for improvements in obtaining and preparing the fibres and other products of the cocoa-nut and its husk.—Sealed November 2, 1841.—(*Six months.*)

Robert Holt, of Manchester, Cotton Spinner, and Robinson Jackson, of the same place, Engineer, for certain improvements in the machinery or apparatus for the production of rotary motion for obtaining mechanical power, which said improvements are also applicable for raising and impelling fluids.—Sealed November 2, 1841.—(*Six months.*)

Moses Poole, of Lincoln's Inn, Gentleman, for improvements in machinery used in the manufacture of bobbin-net or twist lace. Communicated by a foreigner residing abroad.—Sealed November 2, 1841.—(*Six months.*)

Henry Kirk, of Tavistock Square, Gentleman, for a substitute for ice for skating and sliding purposes.—Sealed November 2, 1841.—(*Six months.*)

William Brunton, of Neath, Glamorgan, Engineer, for an improved method or means of dressing ores and separating metals or minerals from other substances.—Sealed November 2, 1841.—(*Six months.*)

Jeremiah Bynner, of Birmingham, Lamp Maker, for improvements in gas burners.—Sealed November 2, 1841. (*Six months.*)

Edward Robert Simmons, of Croydon, Esquire, for

improvements in apparatus for preventing splashing in walking.—Sealed November 2, 1841.—(*Six months.*)

Henry King, of Webber Row, Westminster Road, Engineer, for certain improvements in steam-engines and boilers.—Sealed November 4, 1841.—(*Six months.*)

Jules Lejeune, of North Place, Cumberland Market, Manufacturing Chemist, for a means of condensing and collecting the sulphurous and metallic vapours, which are evolved in the treatment by heat of all kinds of ores.—Sealed November 4, 1841.—(*Six months.*)

Job Cutler, of Lady Pool Lane, Birmingham, Gentleman, for improvements in the construction of the tubular flues of steam-boilers.—Sealed November 6, 1841. (*Six months.*)

John Carr, of North Shields, Earthenware Manufacturer, and Aaron Ryles, of the same place, Agent, for an improved mode of operating in certain processes for ornamenting glass.—Sealed November 9, 1841.—(*Six months.*)

Jesse Ross, of Leicester, Manufacturer, for a new wool-combing apparatus.—Sealed November 9, 1841.—(*Six months.*)

Henry Davies, of Birmingham, Engineer, for certain improved machinery suitable for applying power to communicate locomotion to bodies requiring to be moved on land or water.—Sealed Nevember 9, 1841.—(*Six months.*)

Jesse Smith, of Wolverhampton, Lock Maker, for improvements in the construction of locks and latches applicable for doors and other purposes.—Sealed November 9, 1841.—(*Six months.*)

William Edward Newton, of Chancery Lane, Engineer, for certain improvements in the production of ammonia. Communicatd by a foreigner rssiding abroad.—Sealed November 9, 1841.—(*Six months.*)

William Palmer, of Sutton Street, Clerkenwell, Manufacturer, for improvements in the manufacture of candles. Communicated partly by a foreigner residing abroad.—Sealed November 9, 1841.—(*Six months.*)

John Garnett, of Liverpool, Merchant, and Joseph Williams, of the same place, Manufacturing Chemist, for an improved method of manufacturing salt from brine.—Sealed November 9, 1841.—(*Six months.*)

John Burnell, the younger, of Whitechapel, Manufacturer, for improvements in the manufacture of leaves or sheets of horn, commonly called lantern leaves, and in the construction of horn lanterns.—Sealed November 9, 1841.—(*Six months.*)

John Edwards, of Cow Cross Street, Gentleman, for an improved strap or band for driving machinery, and for other purposes.—Sealed November 9, 1841.—(*Six months.*)

James Stewart, of Osnaburgh Street, St. Pancras, Piano Forte Maker, for certain improvements in the action of horizontal piano-fortes.—Sealed November 11, 1841.—(*Six months.*)

George Allarton, of West Bromwich, Stafford, Surgeon, for certain improvements in the method of balling and blooming iron.—Sealed November 11, 1841.—(*Six months.*)

John Peter Booth, of Hatton Garden, Feather Merchant, for certain improvements in the manufacture of a substance or compound fabric which will be applicable to the making of quilts, coverlets, and wadding, for purposes of clothing or furniture.—Sealed November 11, 1841.—(*Six months.*)

Isaac Davis, of New Bond Street, Optician, for improvements in the manufacture of sealing wax, which compounds are applicable to other useful purposes.—Sealed November 11, 1841.—(*Six months.*)

Edward Joseph Francois Duclos de Boussois, of Clyne Wood Metallurgical Works, near Swansea, Engineer, for improvements in the manufacture of copper.—Sealed November 11, 1841.—(*Six months.*)

John Onions, of Field Lane, Darlaston, Stafford, Engineer, for improvements in the manufacture of certain

descriptions of nails, screws, and chains.—Sealed November 11, 1841.—(*Six months.*)

JAMES YOUNG, of Newton-le-Willows, Lancaster, Chemist, for certain improvements in the manufacture of ammonia, and the salts of ammonia, and in apparatus for combining ammonia, carbonic acid, and other gases with liquids.—Sealed November 11, 1841.—(*Six months.*)

ISAAC DODDS, of Sheffield, Engineer, for certain improvements in the modes or methods of supplying gas for the purposes of illuminating towers and other places. —Sealed November 13, 1841.—(*Six months.*)

HENRY MORTIMER, of Frith street, Soho, Gentleman, for improvements in covering ways, and other surfaces, and in constructing arches.—Sealed November 16, 1841. —(*Six months.*)

JOHN SQUIRE, of Albany Place, Regent's Park, Engineer, for certain improvements in the construction of steam boilers or generators.—Sealed November 16, 1841. —(*Six months.*)

ROBERT STIRLING NEWALL, of Gateshead, Wire Rope Manufacturer, for improvements in the manufacture of flat-bands.—Sealed November 16, 1841.—(*Six months.*)

JOHN VENABLES, of Burslem, Stafford, Earthenware Manufacturer, and JOHN TUNNICLIFF, of the same place, Bricklayer, for a new and improved method of building and constructing ovens used by potters and china manufacturers, in the firing of their wares.—Sealed November 20, 1841.—(*Six months.*)

WILLIAM MANWARING, of York Street, Lambeth, Engineer, for certain improvements in the manufacture of sugar.—Sealed November 23, 1841.—(*Six months.*)

RICHARD GURNEY, of Trewinnion House, Cornwall, Esquire, for a method of cutting wood and incrustating the same, in order to present a sure footing for horses and other purposes.—Sealed November 25, 1841.—(*Six months.*)

INDEX

TO

VOL. XVI. NEW SERIES.

Alteration and disclaimer in Morrall's patent for improvements in the manufacturing of needles, and the apparatus employed therein, 308
Alum, Hervey's patent for improvements in the mode of preparing and purifying, &c., 366
Aubé's, Bernard, for improvements in the preparation of wool for the manufacture of woollen stuffs, and in the process of obtaining the materials for the same, 47

Baggs's, Isham, patent for improvements in printing, 180
Baillie's, Benjamin, patent for improvements in locks, and the fastenings thereto belonging, 162
Barratt's, Thomas, patent for improvements in the manufacture of paper, 22
Beds, mattress, &c.; and in materials for packing, Walton's patent for improvements in the manufacture of, 65
Bethell's, John, patent for improvements in rendering wood, cork, leather, woven and felted fabrics, ropes, and cordage, stone and plaster, or compositions, either more durable, less pervious to water, or less inflammable, as may be required, for various useful purposes, 356
Bread and biscuits, Hill's patent for improvements in making, 54
Bread, Montmirail's patent for improvements in the manufacture of, 346
Bricks, McNab's patent for improvements in the manufacture of, 321
Bridges, viaducts, roofs, and other parts of buildings, Nash's patent for improvements in the construction of, 145
Bromwich's, Bryan J'Anson, patent for improvements in stirrup-irons, 97
Buttons, covered, Parkes's patent for improvements in the manufacture of, 337

Chimneys for lamps, glass, Deacon's patent for improvements in the manufacture of, 102
Clark's, Thomas, patent for a new mode of rendering certain waters less impure and less hard for the supply and use of manufactories, villages, towns, and cities, 225
Clay's, William Neale, patent for improvements in the manufacture of iron, 113
Coating, covering, or plaiting metals, Elkington's patent for improvements in, 239
Cofered spades, &c., Orme's patent for improvements in the manufacture of, 137
Condie's, John, patent for improvements in applying springs to locomotive, railway, and other carriages, 325
Copper, spelter, &c., obtaining from ores, Jefferies's patent for improvements in, 29
Corrosion, prevention of, in metals, &c., Wall's patent for a new composition for the, 134
Cutler's, Job, and Thomas Gregory Hancock's, patent for an improved method of cutting corks, and constructing the necks of bottles, 204
Cutten's, John, patent for an improvement in garden pots, 303
Cutting corks, and constructing the necks of bottles, Cutler and Hancock's patent for an improved method of, 204

Dashwood's, Jonathan Guy, patent for improvements in pumps, 278

Deacon's, James, patent for improvements in the manufacture of glass chimneys for lamps, 102
Detaching locomotive and other carriages, Pope's patent for improvements in, 348
Dickinson's, John, patent for improvements in the manufacture of paper, 129
Dodd's Edward, patent for improvements in piano-fortes, 265
Dordoy's, Stephen George, patent for improvements in the manufacture of gelatine, size, and glue, 304
Drake's, John Collard, patent for improvements in drawing and laying down plans, 221

Economizing heat, and saving fuel, Smith's patent for improvements in the means of, 81
Edwards's, Henry Hind, patent for improvements in evaporation, 93
——————, Downs, patent for improvements in preserving potatoes and other vegetable substances, 249
Elkington, George Richards, and Henry Elkington's patent for improvements in coating, covering, or plating metals, 239
Emmerson's, Richard Farger, patent for improvements in applying a coating to the surfaces of iron pipes and tubes, 173
Evaporation, Edwards's patent for improvements in, 93
Expired patents, 122, 250, 313

Finch's, Edward, patent for improvements in propelling vessels, 351
Forrester's, William, patent for improvements in sizing, starching, dressing, and preparing warps for weaving fabrics, and in the machinery used therewith, 1
Frame-work knitting or stocking fabrics, Wickes's patent for improvements in machinery employed in, 75
Freeman's, William, patent for improvements in paving roads, &c. 118

Garden pots, Cutten's patent for an improvement in, 303
Gas, Lowe's patent for an improved method of supplying, and of improving its purity and illuminating powers, 268
Gelatine, size, and glue, Dordoy's patent for improvements in the manufacture of, 304
Gilbert's, George Alexander, patent for improvements in machinery for obtaining and applying motive power, 4
Guest, Josiah John, and Thomas Evans's patent for improvements in the manufacture of iron, &c. 281
Gunter's, Henry, patent for improvements in preserving animal and vegetable substances, 184

Heath's, Josiah Marshall, patent for improvements in the manufacture of iron and steel, 104
Heating by the circulation of hot water, and for the construction of pipes or tubes, Perkins's patent for improvements in apparatus for, 215
Hervey's, Robert, patent for improvements in the mode of preparing and purifying alum, &c., 366
Hill's, Samuel, patent for improvements in making bread and biscuits, 54
Hinges, Horne's patent for improvements in the manufacture of, 15
Hirst's, William, patent for improvements in the manufacture of woollen cloths, &c. 24
Holland's, Henry, patent for improvements in the manufacture of umbrellas and parasols, 99
Hood's, Charles, patent for improvements in giving signals, 150
Horne's, Thomas, patent for improvements in the manufacture of hinges, 15
Horse-shoes, Vaux's patent for improvements in, 344

Ink or writing fluids, Scott's patent for improvements in the manufacture of, 109
Iron and steel, Heath's patent for improvements in the manufacture of, 104
Iron, Clay's patent for improvements in the manufacture of, 113
——, Guest and Evans's patent for improvements in the manufacture of, 281
Jefferies's, William, patent for improvements in obtaining copper, spelter, &c. from ores, 29
Johnston's, James, patent for improvements in obtaining motive power, 175

Lamps, Parker's patent for improvements in, 157
Locks, and the fastenings thereto belonging, Baillie's patent for improvements in, 162
Lowe's, George, patent for improved methods of supplying gas, and of improving its purity and illuminating powers, 268.

MacGauran's, Thomas, patent for improvements in the manufacture of paper from a material not hitherto so employed, 57
Mangling, drying, and damping and finishing woven goods, Unsworth's patent for improvements in machinery for, 78
Martin's Henry, patent for improvements in preparing surfaces of paper, 50
McNab's, Andrew, patent for improvements in the manufacture of bricks, 321
Montmirail's, Pierre Defaur de, patent for improvements in the manufacture of bread, 346
Morrall's, Abel, patent for improvements in making or manufacturing needles, and in the machinery employed therein, 272
———, Abel, alteration and disclaimer in patent for manufacturing needles, 308
Musical instruments, viz., piano-fortes, seraphines, and organs, Myers and Storer's patent for improvements in the construction of, 193
Myers, John Frederick, and Joseph Storer's patent for improvements in the construction of musical instruments, viz., piano-fortes, seraphines, and organs, 193

Nash's, William, patent for improvements in machinery for winding, spinning, doubling, and and throwing silk, &c, 140
———, patent for improvements in the construction of bridges, viaducts, roofs, and other parts of buildings, 145
Needles and in the machinery employed therein, Morrall's patent for improvements in manufacturing, 275
———, alteration and disclaimer in Morrall's patent for improvements in manufacturing, 308

Orange's, John Edward's patent for improvements in apparatus for serving ropes and cables with yarn, 148
Orme's, William, patent for improvements in the manufacture of cofered spades, &c., 137

Paddle-wheels for propelling vessels, Rapson's patent for improvements in, 33
Paper, Barratt's parent for improvements in the manufacture of, 22
———, Martin's patent for improvements in preparing surfaces of, 50
———, manufacture of, from a material not hitherto so employed, MacGauran's patent for improvements in the, 57
———, Dickinson's patent for improvements in the manufacture of, 129
Parker's, Samuel, patent for improvements in lamps, &c., 157
Parkes's, Joseph, patent for improvements in the manufacture of covered buttons, 337
Patents granted for Scotland, 58, 187 315, 369
———, New, List of, 61, 125, 190, 251, 317, 372
Paving roads, &c., Freeman's patent for improvements in, 118
——— ———, &c, Vandeleur's patent for improvements in, 354
Perkins's, Angier March, patent for improvements in apparatus for heating by the circulation of hot water, and for the construction of pipes or tubes, 215
Piano-fortes, Dodd's patent for improvements in, 265
Pictures or representations of objects, Talbot's patent for improvements in obtaining, 165
Picture-frames and cornices, &c., Spencer's patent for improvements in the manufacture of, 287
Pipes and tubes, applying a coating to the surfaces of iron, Emmerson's patent for improvements in, 173
Poole's, Moses, patent for improvements in tanning and dressing or curring of skins, 257
Pope's, Francis, patent for improvements in detaching locomotive and other carriages, 348
Power, motive, obtaining and apply-

ing, Gilbert's patent for improvements in machinery for, 4
Power, motive, Talbot's patent for improvements in obtaining, 35
———, Johnston's patent for improvements in obtaining, 175
———, obtaining, from steam and other vapours; and in generating the same, &c., William's patent for improvements in, 328
Preserving animal and vegetable substances, Gunter's patent for improvements in, 184
——— potatoes and other vegetable substances, Edwards's patent for improvements in, 249
——— paints and other fluids, Rand's patent for improvements in, 333
Printing, Bagg's patent for improvements in, 180
Propelling vessels, Finch's patent for improvements in, 351
Pumps, Dashwood's patent for improvements in, 278

Rand's, John, patent for improvements in preserving paints and other fluids, 333
Railway-chairs, railway and other pins or bolts, and in wood-fastenings and tree-nails, Ransome and May's patent for improvements in, 209
Ransome, James, and Charles May's, patent for improvements in the manufacture of railway-chairs, railway and other pins or bolts, and in wood-fastenings and tree-nails, 209
Rapson's, John, patent for improvements in paddle-wheels for propelling vessels, 33
Rendering certain waters less impure and less hard, for the supply and use of manufactories, villages, towns, and cities, Clark's patent for improvements in, 225
Rendering cork, leather, woven and felter fabrics, ropes and cordage, stone and plasters, or compositions, either more durable, less pervious to water, or less inflammable as may be required, Bethell's patent for improvements in, 356
Richardson, Walter, and George Mott Braithwaite's, patent for improvements in tinning metals, 111
Ropes and cables, serving with yarn, Orange's patent for improvements in apparatus for, 148

Scales used in drawing and laying down plans, Drake's patent for improvements in, 221
Scott's, Henry, patent for improvements in the manufacture of ink or writing fluid, 109
Signals, Hood's patent for improvements in giving, 150
Silk, Nash's patent for improvements in machinery for winding, spinning, doubling and throwing, 140
Smith's, Junius, patent for improvements in economizing heat and saving fuel, 81
Spencer's, Thomas, patent for improvements in the manufacture of picture and other frames, and cornices, &c., 287
Springs, applying, to locomotive, railway, and other carriages, Condie's patent for improvements in, 325
Stirrup-irons, Bromwich's patent for improvements in, 97

Talbot's, Henry Fox, patent for improvements in obtaining motive power, 35
———, William Henry Fox, patent for improvements in obtaining pictures or representations of objects, 165
Tanning and dressing of skins, Poole's patent for improvements in, 257
Tinning metals, Richardson and Braithwaite's patent for improvements in, 111
Troubat's, Felix, patent for improvements in the manufacture of vinegar, 120

Umbrellas and parasols, Holland's patent for improvements in the manufacture of, 99
Unsworth's, Hugh, patent for improvements in machinery for mangling, drying, damping, and finishing woven goods or fabrics, 78

Vandeleur's, Henry Seymour Moore, patent for improvements in paving roads, &c., 354
Vaux's, Thomas, patent for improvements in horse-shoes, 344
Velocities with which ships, &c., move in fluids, and also the ve-

locities of fluids in motion, Williams's patent for improvements in measuring, 7
Vices, White's patent for improvements in, 284
Vinegar, Troubat's patent for improvements in the manufacture of, 120

Wall's, Arthur, patent for a new composition for the prevention of corrosion in metals, 134
Walton's, James, patent for improvements in the manufacture of beds, mattresses, &c., and in materials for packing, 65
Warps for weaving, Forrester's patent for improvements in sizing, starching, dressing, and preparing; and the machinery used therewith, 1
White's, John, patent for improvements in vices, 284
Wickes's John Baptiste patent for improvements in machinery employed in frame-work knitting or stocking fabrics, 75
Williams's, Thomas Robinson, patent for improvements in measuring the velocities with which ships, &c., move in fluids, and also the velocities of fluids in motion, 7
————————, patent for improvements in obtaining power from steam and other vapours, and for the means employed in generating such vapours, &c, 328
Woollen cloths, &c., Hirst's patent for improvements in the manufacture of, 24
Wool for the manufacture of woollen stuffs, Aubé's patent for improvements in preparing, and in obtaining the materials for same, 47

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